UNITED STATES ARMY
APRIL 1986

AVIATION DIGEST

A VIEW FROM MOUNT OLYMPUS

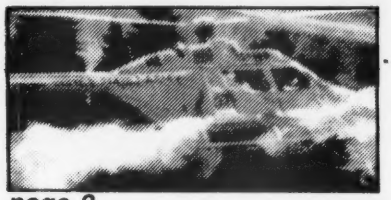
Three years as a branch

APRIL 1986 • VOLUME 32 • NUMBER 4

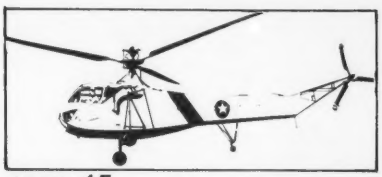
1 **Air-to-Air,** MG Ellis D. Parker
2 **Force Protection,** MAJ Lawrence E. Casper
6 **New MOS System for Aviation Warrant Officers,** CW4 David Day
8 **RK + Aviation = Grounded,** MAJ Rochelle Lopez, M.D.
10 **Views From Readers**
12 **PEARL'S**
15 **Army Aviation Museum: R-4B Hoverfly**
16 **Cobra Gold 85,** CPT Christopher A. Acker
21 **DES Report to the Field: Operator's Manuals and the User Review,** Mr. Stephen M. Harris
22 **Just Another FM?** CW2 Blaine D. Pendleton
25 **A View From Mount Olympus,** Dr. Herb LePore
26 **Aviation Personnel Notes: Aviation Branch—Enlisted Update,** Mr. Roland Weldon; **Aviation Technical Inspectors Needed, Just the Facts**
28 **Above the Best—CW3 Tholan Crosby**
29 **Aviation Maintenance Program,** COL Jerry T. Wagner and LTC Mike Pulliam
34 **Threat: Vozdushnyy Desant,** SSG (P) Roger W. Jacobs
38 **Flight Simulator Sickness,** Mr. Ernest Webb Rickenbacker

Back Cover: **ATC Action Line: Aeronautical Services Office Answers Your Questions,** CW4 Lawrence K. Hanna

Cover: **An overview of our Aviation Branch—3 years of accomplishments, the times in the past that Aviation has been tested and the heritage we are building upon. Story on page 25.**



page 2



page 15

page 22

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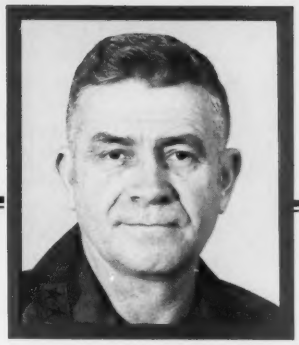
Major General Ellis D. Parker
Chief, Army Aviation Branch



AIR-TO-AIR

WITH THE ever-increasing number of helicopters expected on the modern battlefield of tomorrow, air-to-air engagements are destined to become a reality. Consequently, it is imperative for Army Aviation to possess the capability of overcoming this perceived threat.

Toward this end, certain facts must be determined. Among these are the characteristics an effective air-to-air helicopter must possess; how it should be armed; and, how it must be flown in battle. In October 1984, the U.S. Army published Field Manual (FM) 1-107, "Air-to-Air Combat." This was the Army's first FM to incorporate the tactics and doctrine associated with air-to-air combat involving Army aircraft in support of ground force operations. It identified a void between the method currently being used to train Army aviators to fight and that deemed necessary to enable them to fight *and win* on tomorrow's sophisticated battlefield.

The Soviets have recognized the capabilities of the attack helicopter to support ground force operations, and they have made significant advances in their antiarmor and antihelicopter development programs. They have increased the number of helicopters designed to counter our attack helicopters and have made great strides in developing their attack and assault fleets. Consequently, it becomes mandatory for Army Aviation to train its pilots to counter any air threat while they are performing missions in support of the air-land battle.

We have been conducting the Air-to-Air Combat I (ATAC I) test at Ft. Hunter-Liggett, CA, since 1 December 1985, and it was completed in March 1986. This was a joint proponency test conducted by the U.S. Army Development and Employment Agency and the U.S. Army Aviation Center, using Task Force 268 Attack Helicopter Battalion, 9th Cavalry Brigade Air Attack, Ft. Lewis, WA, as the operational test unit. During my visit to the test site in early January, I was quite pleased with how the testers, the U.S. Army Combat Development Experimentation Center and the U.S. Army Aviation Board, were conducting the test.

ATAC I was to examine all aspects of air-to-air combat in the air-land battle, including the capabilities and limitations of a helicopter unit in applying the doctrinal principles and tactics as outlined in FM 1-107. ATAC I also was to validate the air-to-air combat exportable training package. This test also should provide the data base needed to validate and refine future requirements for doctrine, training and hardware system improvements. It was the first of a planned multiyear effort using a heuristic building block approach (trial and error method or one exploratory in nature).

The tactical context of ATAC I pitted AH-1 Cobra, OH-58 Kiowa and UH-60 Black Hawk helicopters against a threat helicopter force during planned tactical scenarios. The test assessed the performance of helicopters opposing helicopters only. The friendly forces, consisting of air cavalry, attack helicopter and air assault forces, conducted the close-in, rear and deep battle scenarios. The opposing forces included attack and air assault forces.

The objectives of ATAC I included evaluating the operational effectiveness of Army Aviation forces during air-to-air combat, the effectiveness of the ATAC training program and the adequacy of current weapons systems. Issues concerning the effectiveness of an Army Aviation unit in maneuvering against, disengaging from and acquiring a threat rotary wing force were studied.

For each mission scenario involving scout aircraft, an OH-58C equipped with a prototype air-to-air Stinger (ATAS) system was employed as part of the friendly forces. The scenarios using the ATAS equipped OH-58C were designed to permit evaluation of concepts on how to best employ the Stinger missile. This information will greatly assist those involved in planning and conducting the air-to-air Stinger test scheduled for this August and September at Ft. Bliss, TX. The ATAS system will be mounted on OH-58C and D aircraft to examine the Stinger missile utility and suitability in the tactical environment. The test will provide information to be used to evaluate the Stinger missile's air-to-air capability and to determine the reliability and maintainability of the ATAS system.

The recent cancellation of the SGT York DIVAD Gun has significantly affected our anticipated forward area air defense. However, the air-to-air Stinger missile, and the training of our pilots in ATAC maneuvers, will help, along with the other combined arms members, to fill this air defense void. Lessons learned from ATAC I and the ATAS test will serve as the baseline for future ATAC tests. ATAC II is scheduled for the fourth quarter of fiscal year 1987. Collectively, these tests will help to determine the best way to train Army aviators to counter the air-to-air threat with currently available equipment, and undoubtedly will influence the decisionmaking associated with the development of future systems.

The Army's intention is to arm both rotary wing and fixed wing aircraft with an air-to-air defense capability, while the Air Force on the other hand takes a different approach to arm only a select number of aircraft. This article takes a pro/con look at both positions as well as threats posed by air-to-air and air-to-ground operations.

FORCE PROTECTION

AERIAL COMBAT

Major Lawrence E. Casper

MENTION AIR-TO-AIR combat to Army aviators and either their eyes light up reflecting thoughts of becoming another Eddie Rickenbacker or their palms begin to perspire from conjured images of radical maneuvers in an aircraft designed for relatively level flight. Suggest the same subject to ground commanders and they will likely grimace from the concern of losing an essential element of their combined arms team or from the creation of another "Army Air Force."

These reactions and associated apprehensions warrant some legitimacy. However, the presence of large numbers of Soviet Mi-24 Hind aircraft in Third World countries and the current development of the Mi-28 Havoc and KA-?? Hulcom attack helicopters exemplify the need for an antiair capability to be incorporated in Army aircraft. Publication of FM 1-107, "Air-To-Air Combat," and operational evaluation of the manual by the Army Development and Employment Activity (ADEA) and the Combat Development and Experimentation Center (CDED) at Ft. Hunter-Liggett, CA, attest to the Army's convictions to embody air-to-air in its tactics and airframes.* The Army's insistence that air-to-air combat be a prime ingredient in the conceptual design of the future Light Helicopter Family (LHX) enhances this position. The mission of Army Aviation air-to-air combat is no longer a theory. It now is a reality and is surfacing as a major topic of discussion in both Western and Soviet literature.

The author feels that the Army must identify aircraft and crews who are trained in the specific mission of neutralizing the rotary wing threat. These aerial combatants will form the nucleus of specialized organizations that will protect the total force under the ground commander's influence.

The current debate centers on how the threat should be countered. One school of thought advocates hanging air-to-air weapons on everything that flies. This concept is not unprece-

*Operational validation of this air-to-air test was completed in March 1986. Results are scheduled, at this writing, to be published in June 1986.

Views expressed herein are not necessarily those of the Department of the Army nor the U.S. Army Aviation Center.

dented. It was a posture the British assumed in part during the Falklands/Malvinas War when they armed their Nimrod aircraft with AIM 9L Sidewinder missiles. Although the arming was motivated by the extended ranges flown without fighter escort between the Ascension and Falkland Islands, it rekindled the argument of aircraft self-defense.

The opposing position is to arm a select few; a philosophy shared by the U.S. Air Force. Its multirole aircraft (F-4, F-15, F-16) easily can be converted to either air-to-air or air-to-ground ordnance, or any combination. But the Air Force is particular not to assign an air-to-air mission to a close air support squadron, or conversely. The squadron characterized by F-15s loaded with bombs is destined for missions against airfields or command and control facilities, all aimed at neutralizing the aerial threat. Other fighters equipped with air-to-air missiles will ensure that the skies remain friendly. Both are chartered with the air suppression mission and clearly with one objective in mind—air superiority.

Air Force doctrine articulates air superiority as a prerequisite to all combat operations, both air and ground. Once established, battles can be conducted unmolested from the air. The confidence in this philosophy is reflected by the service initially not equipping its primary close air support aircraft (A-10) with an air-to-air capability. However, the aircraft's 30 mm cannon could be employed defensively and there have been discussions to integrate the AIM 9 into the system. Additionally, in excess of 85 percent of the Air Force's multirole fighter (F-16) squadrons have been identified to conduct air-to-ground operations. Thus the requirement for a variety of aircraft configurations and missions has resulted in specialized Air Force organizations.

The Army's approach leans more toward arming everything that flies. The weapon selected to accomplish this task is the ground launched Stinger missile converted to fire from an airborne platform. The initial fielding will mount the missile on the OH-58D Kiowa (AHIP). This is a logical step considering the aeroscout has a secondary mission to provide security for the attack helicopter during engagements. Subsequent arming with the Stinger or a comparable system will occur on the AH-1 Cobra and AH-64 Apache fleets.

The air-to-air goal is to provide the attack helicopter and cavalry units with an ability to counter any unexpected attack posed by threat fixed or rotary wing aircraft, with emphasis on the latter. FM 1-107 addresses air-to-air combat organizations in general terms, and states:

> On the air-land battlefield, commanders can expect to dedicate aviation assets to air-to-air combat for specific time periods or in designated areas. The mission and nature of the threat will primarily dictate the method of employment and the percentage of the aviation force dedicated to air-to-air combat.

Arbitrarily designating crews or organizations to perform the air-to-air mission while simultaneously requiring antiarmor crew proficiency equates to partial preparation and may best be described by the adage, "a jack of all trades and a master of none." Air Force air-to-air squadrons do drop bombs, but their participation is limited to familiarization training only. The cost, sophistication and complexity of the air superiority mission mandates the need to direct the majority of their training sorties and resources toward the unit's primary mission.

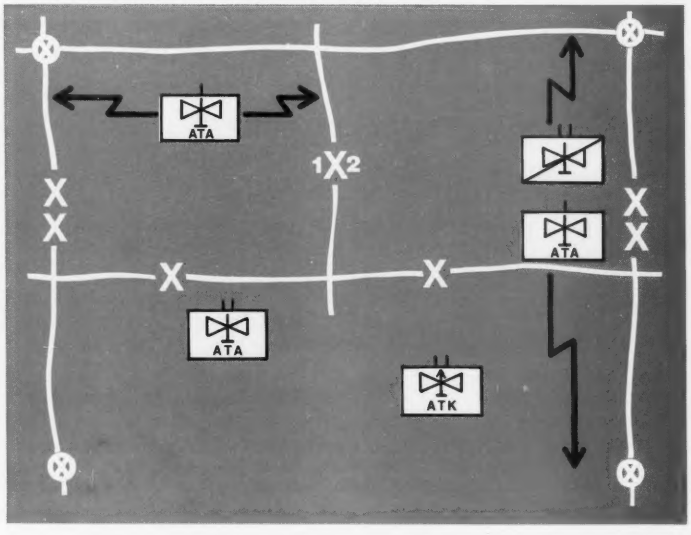
Organizations concentrating on the antiarmor mission and expecting air-to-air proficiency are equally unacceptable. This is not to imply that OH-58 scout or AH-1 Cobra aviators during the performance of their missions do not need to know what actions to initi-

ate in order to evade or defeat an unexpected air threat. Nor does it profess the aircraft need not be equipped with a system (guided/ballistic) to suppress the attacker during the attempt to break contact.

What is essential is that Army aviators are educated to the vulnerabilities of not only their aircraft and tactics but also those of their enemy. Army aviators do not need to be experts in air-to-air, nor do they require costly, complex antiair systems. Training and subsequent employment of the preponderance of Army aviators should be in defensive maneuvering with decisive engagements as a last resort. The intent is to be knowledgeable of the immediate action, but focus the aviators' energies on missions that directly support ground commanders (e.g., antiarmor, air assault, reconnaissance, etc.). As the pilot performing air-to-air or antiarmor detection, acquisition and destruction becomes increasingly reliant upon sensors, the need for aviator specialization becomes imperative. There does exist a need for *selected organizations* to be the aggressor and to initiate the offensive in air-to-air combat with the mission of force protection.

The Army and the aviation community must examine the requirement for specific aircraft and crews to conduct air-to-air combat. The author contends that the demands of technology in aerial combat, the stress on the airframes and the aviator fatigue associated with air combat maneuvers necessitate specialized aircraft, training and organizations. These units must be integrated into the combat aviation brigade at division and corps and organized with aviators trained and equipped to gain and maintain air su-

Possible sectors for counterair activities.



periority on the battlefield. This force will negate aerial harassment, thus allowing the remainder of the aviation assets and the ground forces to execute their mission.

Creating a separate organization guarantees a highly trained and responsive force available to counter the threat. As suggested in FM 1-107 (see figure), division/brigade boundaries could be used as sectors for counterair activities with antihelicopter responsibilities delegated to a proper mix from the force protection unit. A second option would be to place an element of the force protection organization under the operational control of the attack helicopter battalion or air cavalry squadron. In either case, the air-to-air helicopter could provide escort or be employed in a similar manner as the Air Force combat air patrol. A portion of the force could possess the ability to assume an antiarmor role, but their level of training proficiency would not exceed mission familiarity.

The proposal is, of course, not without controversy. First, when viewing the modern battlefield, the placement of yet another airframe in an already crowded airspace, characterized by helicopters, fixed wing, artillery and remotely piloted vehicles, has the potential to aggravate the congestion and amplifies the need for thorough planning and precise coordination. Second, monies to fund the organizations and the critical personnel spaces to man them will strain lean budgets and task the force structure experts to seek a solution within the current manpower constraints. This is a formidable challenge when the object is to ensure the ground commanders' combat readiness is not degraded in order to acquire the air-to-air capability.

The author's final concern involves the potential infringement upon the Air Force charter to provide air coverage. Although politically sensitive, the self-defense of the ground maneuver force and its associated combat assets does not constitute a conflict of interest with the Air Force mission. The circumstances during which Army aircraft will engage in aerial combat are in contrast to those of the air arm. The Army air-to-air battlefield will occur among the trees, buildings, valleys and between the hills—a dimension with which Army aviators are intimately familiar and one in which they are best suited to survive.

The work of ADEA and CDEC on air-to-air validation of FM 1-107, and follow-on testing, will serve as a vehicle to determine the optimum employment and related techniques. Already, the complexity of the training and the perishability of the skills add credence to the requirement. As experience is gained in rotary wing air-to-air employment, the Army Aviation community will be able to validate the need for specialized units. These tactics coupled with LHX development will aid in the creation of a lethal air-to-air organization—one that provides the ground commander with total force protection and Army Aviation with the ability to take the initiative in aerial combat.

With recognition by the Army's leadership—of the need for a specialized aircraft and organization—will come the ability to enhance the Army aviator's confidence, assure the other maneuver arms commanders that Army Aviation is a viable partner and provide Army Aviation with the lethality to neutralize the treetop air threat.

ABOUT THE AUTHOR

Major Casper is the executive officer of the 268th Attack Helicopter Battalion, Ft. Lewis, WA. The 268th AHB, augmented with aviators and support personnel from the 9th Cavalry Brigade (Air Attack), recently completed the air combat maneuver test at Ft. Hunter-Liggett, CA.

New MOS System for Aviation Warrant Officers

CW4 David Day
Aviation Proponency Office
U. S. Army Aviation Center
Fort Rucker, AL

ON 12 APRIL 1983, the Secretary of the Army approved Army Aviation as a combat arms branch of the Army. On 6 June 1983, the Army Chief of Staff signed a letter that directed the transfer of responsibility for Army Aviation to the United States Army Aviation Center, Ft. Rucker, AL.

One of the major goals of the Army Aviation Branch has been to ensure the best possible personnel management for all of its members. In this continuing effort, the Aviation Branch has been an active member of the proponency community during recent personnel management studies such as the Officer Personnel Management Study, the Total Warrant Officer Study (see December 1985 *Aviation Digest*, page 1) and the Enlisted Personnel Management Study.

- The first character identifies the occupational area:

  1—combat operations

- The second character identifies the occupational group (branch):

  15—Army Aviation

- The third character identifies the military occupation (area of concentration):

  152—rotary wing attack

- The fourth character identifies the military occupational specialty/aircraft qualification:

  152F—Aircraft Qualification, AH-64

- The fifth character identifies the SQI. There are no changes to the current SQIs found in AR 611-112, "Manual of Warrant Officer Military Occupational Specialties":

  152FC—Instructor Pilot

- The sixth and seventh characters are used to identify additional skill identifiers (ASI) as shown in AR 611-112. The two new approved ASIs are 2D—Instructor Pilot and 2M—Aeromedical Evacuation Pilot:

  152FC1A—OH-58D qualified

- The eighth and ninth characters of the MOS can be used to show either a language identification code or another ASI:

  152FC1A1M—AH-1S qualified

FIGURE 1 (right): An illustrated example of the new MOS system.

The Army Aviation warrant officer (AWO) has been our least understood and most misused asset. One of the reasons for this has been the military occupational specialty (MOS) system under which the AWO is managed. The primary problem with this system is that even though the warrant officer MOS has five characters, the first three characters of all warrant officer aviators' MOSs are the same, i.e., 100. The fourth character of the MOS is used to identify aircraft qualifications.

The current lettering system used to identify aircraft qualifications causes another problem; for example, the letter "B" would identify an individual qualified to fly utility/observation helicopters. Some of the aircraft included in the utility/observation group are UH-1 Huey, OH-58 Kiowa, OH-58D and OH-6 Cayuse, to name a few. The question then becomes one of, "Which aircraft is the individual actually qualified to fly?" The fifth character is used to show a single, special qualifications identifier (SQI).

In September 1983, the Aviation Center's Aviation Proponency Office developed and staffed a revised AWO MOS system to correct these problems. In October 1985, this proposal was modified to align the numbering system with that of the commissioned officer aviator (15). The commonality between the systems would allow for easier identification of Army Aviation positions. Work is ongoing to align all officer MOS identifications in a similar manner.

On 13 December 1985, LTG Robert M. Elton, Deputy Chief of Staff for Personnel, approved the AWO MOS proposal for implementation. Under the current milestone schedule, reclassification of personnel is to be completed by March 1987. The Aviation Center proposal is designed to show both the aircraft qualification and a military occupation (area of concentration) within the first four characters of the MOS. The new MOSs are best illustrated in figures 1, 2 and 3.

A question that frequently arises concerns an individual who is qualified in more than one aircraft or has been awarded more than one SQI. What is his or her primary MOS? The Aviation Center has recommended that the primary MOS, to include SQI, be based on the last MOS-producing functional training received. For example, if an individual who is CH-47 Chinook qualified (MOS 154B) is selected for the Fixed Wing Multiengine Qualification Course (U-21) and successfully completes it, his or her new MOS would be 155D.

The letter of notification to implement the AWO MOS system was released for distribution to the major commands on 13 December 1985.

If you have questions concerning the new AWO MOS system write to the Aviation Proponency Office, ATZQ-P, U.S. Army Aviation Center, Ft. Rucker, AL 36362-5000, or call AUTOVON 558-3423/5706/2359; FTS 533-3423/5706/2359; Commercial (205) 255-3423/5706/2359.

150—air traffic control
151—aviation maintenance
152—rotary wing attack
153—rotary wing utility
154—rotary wing cargo
155—fixed wing utility
156—fixed wing surveillance

FIGURE 2: The seven areas of concentration for aviation warrant officers.

Aircraft Qualification	Old MOS	New MOS
ATC technician	150A	150A
Aviation maintenance technician	160A	151A
OH-58A/C scout pilot	100B01D	152B
OH-6 scout pilot	100B01C	152C
OH-58D scout pilot	100B01A	152D
AH-64 pilot	100K0	152F
AH-1 pilot	100E0	152G
Rotary wing aviator	100B	153A
UH-1 pilot	100B01E	153B
OH-58A/C pilot	100B01P	153C
UH-60 pilot	100A0	153D
CH-54 pilot	100D0	154A
CH-47A/B/C pilot	100C01G	154B
CH-47D pilot	100C01B	154C
Fixed wing aviator	100Q0	155A
U-21 pilot	100Q02J	155D
C-12 pilot	100Q02P	155E
OV-1/RV-1	100R02K	156A

FIGURE 3: Aircraft qualification codes.

RK + Aviation = Grounded

If you're nearsighted and tired of wearing prescription lenses then corrective eye surgery is an attractive alternative, ***UNLESS*** your plans are to become an Army aviator!

Major Rochelle Lopez, M.D.

RADIAL KERATOTOMY or refractive keratoplasty (RK) is a procedure for the correction of myopia (nearsightedness) which has gained considerable popularity in recent years. It has been recommended for those myopes, who for professional or personal reasons, are not able to or do not wish to wear glasses or contact lenses. All aviators are aware that quality of vision is what counts, and not just how many letters you can make out on a chart in a darkened room under ideal conditions.

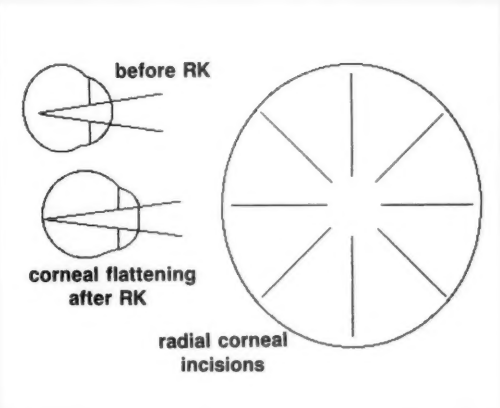
Through ignorance of the visual demands of aviation and the limitations of the procedure, a number of would-be military pilots have undergone the procedure only to discover that they now are disqualified from flying. The *most unfortunate aspect* is that often the pilot *may have been qualified* to fly with his or her preoperative vision.

Currently, individuals who have undergone RK surgery are not eligible to enter aviation training. Exceptions to this policy are not favorably considered. Further, RK surgery renders an individual ineligible for induction into active military duty with the U.S. Army.

The procedure itself is quite simple. Eight, 16 or more radial (spoke-like) incisions are made on the clear cornea in order to flatten it and allow the rays of light to focus on the retina. The results are not as predictable as desired.

Most people undergoing RK surgery are hoping to achieve good vision and also to get rid of their glasses forever. What they are not aware of is that:

- Their best corrected vision may never be as good as the vision they had prior to surgery.
- They may be exchanging good near vision without glasses for an inability to see *at distance or near* without glasses. In addition, they can expect bifocals at an early age.
- Correction with glasses or contact lenses may not be an option after RK.



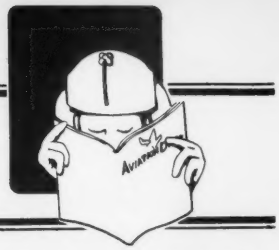
- Vision may fluctuate from hour to hour and may not stabilize for years. If that wasn't enough, the latest analysis of the longer term results indicates that those who had the best results are becoming farsighted.
- Astigmatism (regular and irregular) may develop after RK surgery even where none was present before.
- Glare will be present, which to an aviator may be incapacitating. It is difficult enough to fly in the bright sky even with sunglasses or a visor without adding built-in glare to the eye itself.
- Night vision will be affected as the dilated pupil renders the eye more susceptible to the light scattering taking place at the corneal incisions.
- There is the weakened condition of the eye, which will last for years. Studies show the cornea does not heal well and the operated eye subjected to trauma will rupture at 50 percent of the energy it takes to rupture a healthy eye. Also, there will be 30 percent of people who will sustain microperforations (even in the hands of the best surgeons). This leads to an additional 50 percent decrease in the energy it takes to rupture the eye.

Surgery is not reversible. Refractive surgery does not result in the quality of vision necessary for aviation. My recommendation as an opthamologist, aviator and flight surgeon is that individuals considering an aviation career do not undergo refractive surgery.

ABOUT THE AUTHOR

MAJ Rochelle Lopez, M.D., MC, FS, opthalmologist and flight surgeon, currently is doing research in aeromedical vision problems at the United States Army Aeromedical Research Laboratory, Ft. Rucker, AL. References available upon request.

VIEWS FROM READERS



Editor:

The article "Air Assault—The Cross-FLOT Raid" by CPT J. F. Murphy (September 1985) was well written and informative.

Unhappily, I must register a complaint. Paragraph 2 begins, "1LT Rossiter was about to put out his cigarette, when..." 1LT Rossiter is portrayed as an effective, efficient officer, the kind of subordinate that every commander would want. Unfortunately, 1LT Rossiter is also portrayed smoking.

Isn't it about time that we stopped portraying smokers as: macho, persons to look up to and emulate, effective and efficient, and instead, portray smoking as it really is: unhealthy (both for the smoker and his associates), dirty and increasingly socially unacceptable?

Please do not dismiss this as one "anti-smoker" crank letter. The Surgeon General of the United States estimates that less than 30 percent of the population in the United States now smokes. Further, the Surgeon General has described as a National health goal a "smoke-free" society by the year 2000.

With the emphasis in today's Army on healthy, physically fit soldiers, I feel that it is inappropriate for an official U. S. Army publication to publish an article that (even unintentionally) glamorizes smoking.

Bruce Prater
Safety Manager
Seventh Army Training Command
Grafenwoehr, FRG

Editor:

Recently the E4 67G personnel received letters about voluntary reclassifications. More recently plans were announced to contract maintenance for U-21 and RU-21 aircraft. The writing is on the wall or so it appears. The big question is what's going to happen to the NCOs? I have two NCOs going to the 66G course. What for? Sure seems like a waste of time and money. Not all of these NCOs can fit into a (OV-1) Mohawk unit. As a maintenance officer I have 20 people asking these same questions. All I can do is tell them that somebody must be working on it. These are some dedicated soldiers in the fixed wing business that are being kept in the dark. How about some light on the subject.

CPT(P) Joseph C. Donahue
Maintenance Officer

The *Aviation Digest* received the following response from MSG Cole, MILPERCEN, to Captain (P) Donahue's letter:

The Army recently announced that it is considering eliminating military occupational speciality (MOS) 66G and 67G and seeking total contract support for all U-21 Ute aircraft. As a result, many people in the MOS are concerned. These concerns are expressed in many letters and calls to the U. S. Army Military Personnel Center (MILPERCEN) and the U. S. Army Aviation Center at Ft. Rucker, AL.

What's going to happen to the NCOs? Are we still sending NCOs to the 66G course? When will I be reclassified? Will I be able to stay in Army Aviation? Will I be trained in a new MOS? Will I get the opportunity to select an MOS or will the Department of the Army (DA) just give me another MOS? Who decided to do this? The information below is provided by the Aviation Enlisted Career Management Branch at MILPERCEN, and hopefully will reduce some of those concerns.

Recently, MILPERCEN forwarded letters to selected soldiers in MOS 67G soliciting voluntary reclassification due to overstrengths in some grades. This was part of an ongoing effort by DA to balance all MOSs and increase soldier promotion opportunities. These letters had no connection with a recent decision to consider contracting out the services and maintenance on U-21 aircraft.

The Under Secretary of the Army, in a memorandum dated 12 August 1985, to the commanding general, U. S. Army Materiel Command, directed him to explore the possibility of supporting the U-21 aircraft through commercial contract. All services (Army, Navy and Air Force) currently support the C-12 aircraft through contract maintenance. If adopted, the proposal would require award of a competitive contract for worldwide logistics and service support of all U-21/RU-21 aircraft, to be effective on 1 October 1986.

Since the MOS enjoys a healthy strength posture, action has been taken to suspend training in MOS 66G while awaiting the final decision and to renegotiate enlistment contracts on soldiers who have not yet begun MOS training.

If the decision is made to eliminate the MOS, MILPERCEN will contact the affected soldiers through their local military personnel offices (MILPOs) and direct them to initiate a request for reclassification. The soldiers will have the opportunity to select three MOSs in which they are qualified. They may select other Army Aviation MOSs or any MOS for which they qualify. Training will be provided in the new MOS if the soldier has not been previously school trained in that MOS.

When soldiers select new MOSs, they should consider those that are short or balanced in the soldier's next higher grade. It is in the best interest of the soldiers to select MOSs that have shortages since this will enhance their potential for promotion. Soldiers must meet all prerequisite qualifications for the selected MOS. Soldiers cannot be reclassified into an MOS for which they do not meet the prerequisites.

During all reclassifications every effort is made to place soldiers in MOSs of their choice; but if soldiers fail to select MOSs

in which they are qualified, or in which the Army has requirements, they are reclassified based upon the needs of the Army. The soldier's best source of advice on MOS availability, on schooling and on promotion opportunities is the local MILPO.

Editor:

I am interested in acquiring the following articles that were published in your magazine. Please also send me the address to write to find information on the qualifications on becoming an Army aviator (warrant/commissioned officer). Your assistance is greatly appreciated.

- March 1984—"Training the Aviation Warrant and Commissioned Officers."
- April 1984—"Aviation Officer Basic Course and the Warrant Officer Candidate Military Development Course."
- May 1984—"Officer/Warrant Officer Rotary Wing Aviator Course."

CPL Scott Nagle
U.S. Marine Corps

• To get specific answers about qualifications needed for the Army aviator warrant and commissioned officer programs, write to U. S. Army Military Personnel Center, Hoffman II, Room 7N12 (DAPC-CSP), 200 Stovall Street, Alexandria, VA 22332.

Editor:

The July and August 1985 issues of the *Digest* contained two good articles on the combat aviation brigade (CAB). There were, however, several misleading statements or issues that need to be clarified.

In Major General [Frederic J.] Brown's article "Attack Helicopter Operations on the Heavy Battlefield," in the July issue, the 1st Brigade commander stated that he wanted the 251st Attack Helicopter Battalion (AHB) commander to be prepared to occupy attack positions, with one company on short notice. Doctrine calls for attack helicopters to be employed no lower than battalion level. Given such guidance, I am sure that the 251st AHB commander planned to use his entire battalion to prepare for this task—one company could not provide 24-hour readiness against the known threat. As the battle developed, all of the 251st AHB was committed into EA STRIPE, the area designated for the one attack helicopter company. The 1st Brigade commander should have told the 251st to be prepared to reinforce by fire TF#2-91, not merely "with one company." As the 251st AHB commander, I would have given the daylight mission to one attack company and the night mission to another, with the third company as backup. All three companies would have received a be prepared mission to "surge in EA STRIPE and support operations in EA APACHE." Too many people are routinely fighting attack helicopter companies instead of battalions. The wording of this mission—although probably understood by all players involved—fuels the confusion that exists in many units and schools on how to fight attack helicopter units. Let the AHB commander sort out how to accomplish the missions.

Another misleading statement concerns the 2.75 inch rocket capability for most AH-1S AHBs—they are only authorized the seven-shot, M158 rocket pods. The inexperienced would assume that an attack company with a full load of rockets would carry greater than 70 rockets in a standard 3X5 battle configuration—NOT SO! Unless the TOE/MTOE [table of organization and equipment/modified TOE] wizards authorize all of our AHBs the 19-shot pods, attack units will be limited on rocket power!

In the August *Digest*, Major General [John W.] Foss addressed the CAB in the light infantry division. His scenario left out the reconnaissance squadron, did not adequately task organize the attack helicopter battalion and, like Major General Brown's article, discussed placing one company OPCON [operational control] for the AHB.

The most effective way to fight the reconnaissance squadron is to leave it under its parent organization—the CAB. In this article, it was totally left out of the CAB operation. The Armor School and others have pushed to have the squadron under division troops where it served well as an H-Series organization. Under the Army of Excellence, however, with its limited aviation assets and logistic link to the CAB, the squadron must be part of that organization. Leaving the squadron out of this operation in his article, Major General Foss makes the same mistake the 82d Airborne Division did in Grenada—DON'T FORGET THE CAV!

Major General Foss also mentioned that the employment of the CAB as a maneuver headquarters, while viable and feasible, will be of "secondary importance." The CAB will always be in the support role, particularly in the light divisions, but preparing for the rear, close and deep battle and then executing on call had better be the norm or our air-land battle doctrine will never work. Maneuver exercises for the CAB should be discussed, written about and tried on a routine basis. The more we practice, the better we will get. "Secondary importance" is being quoted too often and has created the wrong momentum in many areas.

Army Aviation publications, articles and manuals must clearly state the best way for the CAB to fight—as both a support and maneuver force with its organic reconnaissance or cavalry squadron under CAB control. Having recently departed from the 2d Squadron (Recon), 10th Cavalry, 7th Infantry Division (L), I can assure you that working under the umbrella of the CAB did not hamper our abilities to report on the battlefield. On the contrary, it reinforced them. The CAB commander always ensured that I had adequate assets in helicopters, people and support to accomplish the mission. The reconnaissance squadron in the light divisions and the cavalry squadron in the heavy divisions are important maneuver units within the CAB and should work directly for the CAB commander in garrison and under most combat situations.

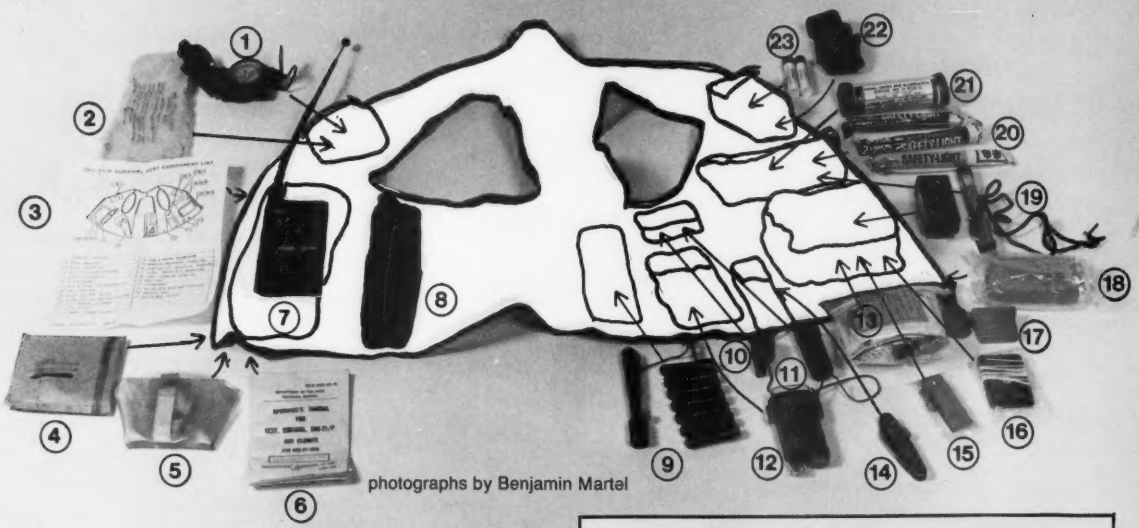
Again, these were good articles and serve as references for units and students of [Army] Aviation. We need more articles like them to help in understanding the doctrine of our branch.

LTC R. Dennis Kerr
Department of Tactics
U.S. Army Command
and General Staff College
Ft. Leavenworth, KA

Articles from the Aviation Digest requested in these letters have been mailed. Readers can obtain copies of material printed in any issue by writing to: Editor, U.S. Army Aviation Digest, P.O. Box 699, Ft. Rucker, AL 36362-5000.

SRU-21P Survival Vest Components

This is the equipment used by the Aviation Development Test Activity at Ft. Rucker. The inclusion of some items will be at the discretion of major commands.



photographs by Benjamin Martel

1. lensatic compass
2. marker panel
3. vest component's diagram (inside left pocket)
4. saw assembly (inside left pocket)
5. water bag (inside left pocket)
6. operator's manual (inside left pocket)
7. survival radio
8. hunting knife
9. signal kit (pen flares)
10. whistle
11. plastic match box
12. distress light marker
13. individual survival kit
14. pocket knife
15. magnesium fire starter
16. signaling mirror
17. earplug case
18. combat casualty blanket (inside right pocket)
19. crew light (left) or pen light (right)
20. three chemical lights
21. smoke and illumination signal
22. tourniquet
23. hot and cold weather lipstick

Dawna Salazar

Light Marker Distress, Cracking/Chipping

Several equipment improvement recommendations (EIRs) were received pertaining to the cracking and chipping of the plastic flash guard on the marker distress strobe light. The Commander, U.S. Army Support Activity, ATTN: STSAPS-PS, 2800 South 20th Street, Philadelphia, PA 19101, reports they could not duplicate this cracking/chipping. Please be alerted to the possibility of damaging the flash guard by forcing the "wrong" end of the flash guard over the distress light marker. Technical Manual 55-8465-215-10 shows how the flash guard should be inserted in the marker distress light when operating in a combat environment. Should you encounter further problems, submit your EIRs and furnish a copy to PEARL'S for monitor action. Natick Laboratories, ATTN: DRDNA-UAM, has been notified of this problem, but they too have not been able to duplicate the cracking/chipping problems.

ALSE MOSs Actions

The "battle" of the aviation life support equipment (ALSE) "military occupational specialties" (MOSs) is much closer to a solution than ever before. We will keep you informed of these actions as they occur and hope that this issue will be resolved in the near future. We are gaining much support for the ALSE MOSs needed and should see a monumental effort real soon. Keep the faith ALSE folks. Good things come slow but are lasting.

Army Regulation (AR) 95-17

We are reviewing AR 95-17, "Army Aviation ALSE System Program," for revision. Now is the time to prepare DA Form 2028 and identify recommended changes. Full justification must be included. Address the DA Form 2028s to the AMC Product Manager, Aviation Life Support Equipment, ATTN: AMCPM-ALSE, 4300 Goodfellow Blvd., Building 105, St. Louis, MO 63120-1798. All comments on 2028s will be reviewed and consolidated and a completed 2028 furnished by this office to the ALSE Management Steering Council for review prior to final action to update AR 95-17. The DCSLOG-AV element that is responsible for ALSE will be furnished copies of appropriate action by this office prior to initiating action to revise AR 95-17. Action officer is Mr. Harlyn Hubbs, AUTOVON 693-3215/3818, at the above address.

Additional Skill Identifier (ASI) ALSE Officer/Warrant Officer

Reference is made to AR 611-112, Table D-1, dated 30 October 1985. The ALSE ASI for warrant officers is "1F" for use with any aviator MOS to identify positions that require qualification in the inspection and maintenance of ALSE, and may be awarded to warrant officers who have successfully completed the Aviation Life Support Technician Course at Ft. Eustis, VA, or who have completed another military service's ALSE training. This new identification has been one of the many actions we in the ALSE arena have undertaken, and is certainly a step in the right direction for this critical area. The enlisted personnel action pertaining to the ALSE MOSs is ongoing and we should hear positive results soon.

Another effort in these areas is identifying table of distribution and table of organization spaces; this will ensure the full support of the ALSE program. PEARL has always been a strong voice to the field and will continue in this role with full support from the Aviation Center, Ft. Rucker, AL; and the Aviation Logistics Training Center, Ft. Eustis. The efforts of CWO "Art" Miskimmon and MSG Barney Baker have been a strong force, along with the ALSE Management Steering Council, to get these actions accomplished, and we have been receiving full support of the Military Personnel Center, Alexandria, VA. We owe all participants a vote of thanks for a job well done.

Aviation Life Support Equipment TC 1-62

Training Circular (TC) 1-62, 14 April 1980, was at the time of its publication an excellent source of information and guidance and served two distinct purposes: To help the commander to establish the aviation life support system training requirements that informed the aircrews of the

availability of ALSE and its proper use. The second reason was to establish guidelines to aid ALSE specialists to maintain and inspect aviation life support equipment.

TC 1-62 was superseded by Field Manual (FM) 1-302, dated 30 September 1983. From the many questions we are receiving from ALSE users in the field it is evident they may not be aware that TC 1-62 was superseded, or they are using it because it does contain a wealth of information. FM 1-302 is still in existence and a series of checklists (CLs) of the basic TM 55-1680-317-23&P, TM 55-1680-317-CL-1 through 8 were published 24 August 1981. Your unit should ensure that you are on pinpoint distribution for the basic TM and the checklists. The draft Aviation Life Support Equipment Inspection Checklist prepared by this office, June 1979, may be retained if desired, but the majority of information is now contained in the checklists mentioned above.

Interim Change 1(101) to AR 40-61, "Medical Logistics Policies and Procedures"

Department of the Army message DASG-HCL # R151601Z October 1985, extended the interim change 1 (101) to AR 40-61. The policies and procedures for management of controlled items in aviation survival kits established by this change will remain in effect until the updated AR 40-61 is published. A copy of the message # R151601Z should be kept on file until receipt of the updated AR 40-61. PEARL will keep you informed of all areas pertaining to ALSE in order to keep you updated about ongoing actions.

Aviation Life Support Equipment Insurance Corporation

Per se, there is no such corporation. The U.S. Air Force publication *Airscoop* developed this certificate and we gave them credit for permission to reprint the article. We have had a lot of requests for the "Policy," and it is an interesting document that certainly highlights the ALSE area. We have a limited number of copies and would be happy to provide them to ALSE users. Ask PEARL for a copy.

Integrated Helmet and Display Sighting System Deficiencies

Recently a large number of quality deficiency reports (QDRs) were prepared by SGRD-UAE-IE, USAARL, Ft. Rucker, and sent to AMCCOM, ATTN: AMSMC-QAD(R), identifying various problems such as defective earcup assemblies (i.e., split ear seals, torn earcup foam); cracked harness assembly (cans) infrared (IR) sensors; and, fold in the headband of the suspension system. Helmets were turned in for repair of IR sensor eyelid; scratches and pit marks on the clear visors of helmets; receiver assembly separated from the helmet shell; cracked helmet visors; cracked suspension system; loss of resilience in the visor retract lever; frayed or defective cord assemblies; scratches and pit marks on the tinted visor.

NOTE: This information is provided so that users can be aware of the many deficiencies being found. Extreme caution must be exercised to prevent as many of these problems as possible. Information will be provided to the manufacturer by the Item Manager, AMSMG-QAD(R), U.S. Army AMCCOM, Rock Island, IL 61299-6000. Please continue to send your QDRs to AMCCOM with an information copy to this office, ATTN: AMCPM-ALSE, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. Action officer is Mr. Jim Dittmer, AUTOVON 693-3215 /3818. PEARL will monitor all actions in an attempt to provide an early solution.

Cold Weather Survival School Training

The 88th Army Reserve Command recently sponsored four Cold Weather Survival School training classes at Camp Summers, Ely, MN. The purpose of these classes was to teach aircrew personnel survival skills in extreme cold climates and to provide the attendees with an opportunity to use survival equipment normally available to downed aircrew personnel. The course was established to enhance Army Aviation safety and ALSE programs. The school was well attended and was open to all aircrew personnel on a first-come-first-served basis. From the reports received, a great deal of survival information was furnished to all participants. Recommendations were made to ensure the school will be conducted in future years. An article is being prepared by Sergeant Mullally of the Aviation Support Facility, St. Paul, MN, highlighting the training aspects and will be published in a future issue of the *Army Aviation Digest*.

If you have a question about personal equipment or rescue/survival gear, write PEARL, AMC Project Officer, ATTN: AMCPO-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-3817/8 or Commercial 314-263-3817/8.

GOAL—
$2,500,000

APRIL 1986—
$1,925,000
CASH AND PLEDGES

Army Aviation MUSEUM

This is a series about the Army Aviation Museum Foundation fund drive. Currently, plans call for building a modern complex to house your Army Aviation Museum. Since last month additional donations have been received. However, we still have a ways to go, as the barometer above shows. If you would like to help "build" the Army Aviation Museum's new home, you are invited to send a tax deductible contribution to: The Army Aviation Museum Foundation, Box 610, Ft. Rucker, AL 36362-5000. If you desire additional information call Mr. Ed Brown at (205) 598-2508.

A Look At What's In Your Museum

Sikorsky R-4B Hoverfly

The R-4 is historically significant as the first helicopter produced for any of the U.S. military forces in other than experimental quantities. Although its achievements in service were overshadowed by later Sikorsky machines, it was this type of helicopter that was used to train the first rotary wing qualified pilots for the Army ground forces.

The XR-4 first flew in January 1942 and later a contract was awarded in 1943 for a total of 100 helicopters. In 1944, an R-4B flew the first helicopter mercy mission by flying blood plasma to a hospital in New Jersey from New York City. Some R-4Bs saw action in the China-Burma-India Theater of Operations during World War II with the 1st Air Commando Group. It was during these operations that the first helicopter rescue of a soldier from enemy held territory was accomplished. The R-4B holds many "firsts" for helicopters and is so important in rotary wing history and development that its designer, Igor Sikorsky, has been named the "Father of the Helicopter." The R-4B on display has been on loan to the U. S. Army Aviation Museum from the U. S. Air Force Museum since September 1969.

Royal Thai Army Bell 212 slingloads Thunderbird 094 off remote and inaccessible beach to a facility where repairs could be made.

COBRA GOLD 85

Captain Christopher A. Acker

In a joint U. S./Thailand military training exercise labeled Cobra Gold 85, members from the 1-19th Infantry Battalion, 25th Infantry Division, 25th Combat Aviation Brigade, 3d Squadron, 4th Cavalry, formed Task Force 118. Their mission, although varied, primarily was to deploy 5,000 miles aboard C-5A and C-141 Air Force transport aircraft to Thailand and lend their support to the 1-19th Infantry Battalion in their efforts to cross-train the Royal Thailand Army in air assault operations. Though plagued with numerous problems from the onset, including having to switch from using the then grounded UH-60 Black Hawks to UH-1 Hueys, Cobra Gold 85 was a success. A lot was learned by the participants and the Thunderbirds gained lasting respect because of their professional performance.

MONTHLY WRITING AWARD

"BANGKOK TOWER, this is Thunderbird One with a flight of eight ready for departure."

"Thunderbird One and flight. You are cleared for departure. Remain at or above 1,000 feet while over Bangkok. Report clear of the city to the south."

It is 0730 hours, 21 June 1985. The eight UH-1 Hueys of Task Force 118, the "Thunderbirds" from the 25th Infantry Division, Schofield Barracks, HI, climb into Bangkok's misty sky over Dogma Airport. Their destination, Pattani, Thailand, lies 450 nautical miles to the south, just 35 nautical miles north of the Malaysian border. As the Thunderbirds formed up at altitude and turned south over the deep blue water of the Gulf of Thailand, I began to reminisce about the events that had transpired over the past 4 weeks.

The formation of Task Force 118 was, of necessity, to support the 1-19th Infantry Battalion, 25th Infantry Division, in a joint U.S./Thai military exercise, "Cobra Gold 85." The worldwide grounding of all UH-60 Black Hawk aircraft in April forced the 25th Infantry Division to change its aviation support package for Cobra Gold 85 from UH-60s to the reliable old warhorse, the UH-1 Huey.

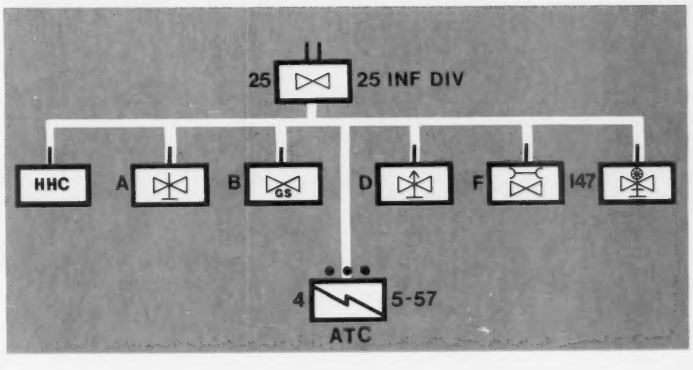
Rising like a phoenix from the newly formed 25th Combat Aviation Brigade, Task Force 118 found itself with just 4 weeks remaining before deployment to train crews and acquire aircraft and vehicles. Their mission would be to deploy 5,000 miles aboard C-5A and C-141 Air Force transport aircraft to Thailand, then support the 1-19th Infantry Battalion for 30 days. Of course, many in the division Army Aviation community were extremely uncomfortable with this "thrown together Huey outfit."

The task force commander developed a risk analysis and presented it to the commander, 25th Infantry Division. Once accepted by the commander, a drop-dead date to cancel the entire mission was established. It was this decision that allowed the task force to train-up, without serious pressures to accomplish the mission, that led to its overall success. The mission was approved by the commander and the greenlight to deploy was given.

With only a short time remaining before the departure date (3 weeks), things had to happen fast. Aircraft, crews and maintenance personnel had to be identified early in order to facilitate a concentrated train-up program for the aircrews. Since the bulk of the mission support would be air assault in support of the 1-19th Infantry Battalion, the task force tailored the train-up program accordingly. A major joint training exercise (JTX) objective was to cross-train the Royal Thai Army in air assault operations.

The acquisition of pilots turned out to be one of the easier tasks. The pilot corps for Task Force 118 was drawn from A Company, B Company and F Company of the 25th Aviation Battalion (figure 1) and from Headquarters and Headquarters Troop, and B Troop, 3d Squadron, 4th Cavalry (figure 2). The immediate problem was how to train this conglomeration of pilots to conduct safe and efficient air assault operations. The bulk of the pilots selected were high-time UH-1 pilots, but only 4 of 20 were current. This made the task of reestablishing currency in the aircraft relatively easy. Before the accelerated train-up program could begin, most of the pilots had to be given currency rides in the UH-1H. Instructor pilots assigned to the task force set up a training program tailored around air assault operations, formation flying, low level,

FIGURE 1: 25th Aviation Battalion (prior to forming the 25th Combat Aviation Brigade).



contour and nap-of-the-earth flight techniques. Meticulous training records were kept on each pilot, thus ensuring that all training requirements were satisfactorily completed prior to deployment.

During the pilot training program, aircraft to train with were at a premium—one or two on most days. The aircraft selected for deployment were scheduled to fly as little as possible prior to the actual deployment. This provided an opportunity for the maintenance people to work off any deficiencies. The 25th Infantry Division was in the process of converting its aviation assets to the combat aviation brigade. Large numbers of UH-1H aircraft were being transferred out of the division, and this drastically reduced the number of aircraft available for training. It was only through the concern of both the 25th Aviation Battalion and the 3d Squadron, 4th Cavalry commanders that aircraft were made available for training.

The formation of an Army Aviation task force may sound easy and look good on paper, but don't be misled. There are certain aspects of the formation of a task force that, if overlooked, can cause problems. It cannot be overemphasized that when forming a task force it should be formed around an established unit.

Task Force 118 was formed as a single entity independent of an Active Duty Army unit, reporting directly to the 25th Infantry Division (assistant division commander). Forming a unit in this manner can cause problems with command and control, not to mention the problems with operating a unit with no table of organization and equipment (TOE). When forming a task force around an Active Duty unit, there are immediate support assets available along with an established command structure. The unit will have a TOE and can order and stock parts and have an operational budget. This makes the job of forming the task force relatively simple, as the brigade commander can take a slice from any unit within his brigade around which to form the task force.

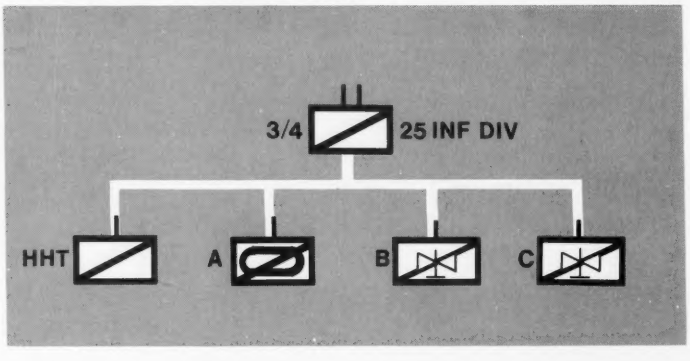
During the formation of Task Force 118, the combat aviation brigade was only provisional. The division's aviation assets were divided between the 25th Combat Aviation Battalion and the 3d Squadron, 4th Cavalry (pilots, aircraft, repair parts and supplies came from these two organizations on a temporary hand receipt basis).

Since the task force was not established around an active aviation unit, there was no existing supply channel available to order spare parts, special and calibrated tools, POL (petroleum, oil and lubricants) assets, or common tools.

The crewchiefs assigned to the task force were told to report with their tool boxes assigned to them by their parent units. Aviation commanders are not enthusiastic about loaning special and calibrated tools out to units for extended periods of time; thus, acquiring some of these tools required command emphasis.

Commanders within the 25th Combat Aviation Brigade (Provisional) cooperated 100 percent in filling up a prescribed load list/authorized stockage list support package for the task force. Many of the parts and tools came from the 25th Combat Aviation Battalion's Aviation Intermediate Maintenance Company, including one senior test pilot and one young aviation maintenance officer. During the last week before deployment, when aircraft parts and tools were being gathered from around the division, the pilots continued to train. Several air assault missions were flown in support of the 25th Infantry Division as a climax to the pilot train-up program.

FIGURE 2: 3d Squadron, 4th Cavalry, 25th Infantry Division (prior to forming the aviation brigade).



The Thunderbirds replacing a UH-1H main rotor blade, Dogma Thai Army rebuild facility.

The deployment date arrived almost before we knew it. What had been accomplished in just 4 short weeks was phenomenal. Equipment was loaded and prepared for deployment. The aircraft were flown to Hickam Air Force Base, HI, for loading on C-5A and C-141 aircraft. On deployment day, the CW4 test pilot went on emergency leave. This made for exciting times.

The aircrews and maintenance people deployed to Bangkok 3 days ahead of the aircraft in order to comply with crew endurance requirements. When the C-5A arrived at Bangkok, the crews already there were rested and ready to unload and began reassembly immediately. Aircraft were unloaded and towed to a Thai Army helicopter rebuild facility at Dogma Airport. The following day, reassembly was completed and all aircraft were test flown. Daily inspections were performed, aircraft refueled and loaded with cross-country aviation support equipment and a support maintenance package.

The flight to the exercise area was measured at 450 nautical miles in length over jungle, coastal and open water areas. The task force had to prepare for every possible contingency. One of the lift ships was bumped off the C-5A flight and replaced with a UH-1H with rescue hoist to be used in case an aircraft were forced to ditch in the Gulf of Thailand. Every aircraft carried a case of meals ready to eat, 10 gallons of fresh water, jungle survival kit and individual aviation life support equipment.

During the second leg of the journey south, Thunderbird 094 experienced engine trouble and was forced to land on an extremely remote and inaccessible beach. Ground vehicle travel to the downed aircraft site was impossible. Prior planning for this contingency worked to perfection as the crew was prepared to spend the night with the aircraft until guards from the 1-19th Infantry Battalion could be flown to the site to relieve them. Thunderbird 094 spent several days on the beach awaiting a replacement engine from Hawaii. Coordination was made with the Royal Thai Army to slingload the aircraft to a location where repairs were made. Thunderbird 094 eventually joined the rest of the task force and contributed immensely to the success of the mission.

During the next 4 weeks, Task Force 118 performed a myriad of arduous missions in support of Cobra Gold 85. Along with air assault operations, the task force conducted reconnaissance missions, convoy control, night vision goggles missions, command and control, and medevac missions. During the actual JTX, the Thunderbirds conducted air assault in support of an amphibious operation. Maintenance down-days were programed into the support cycle. This resulted in the task force being able to maintain an operational readiness rate in excess of 95 percent for more than a 30-day period, which in itself was a remarkable feat because

Thunderbirds conducting an air assault with 1-19th Infantry Battalion, Pattani, Thailand.

of the extremely long logistics pipeline involved.

Task Force 118 was deployed for more than 30 days, flew 400 accident-free hours in extreme heat, over unfamiliar terrain, and accomplished all missions in a most professional manner. The task force participated in a major joint service amphibious assault and was highly praised for its contribution to the success of the entire exercise.

On 24 July, the Thunderbirds deployed back to Schofield Barracks—mission completed! The task force was disbanded and aircrews and maintenance people reported back to their parent units. Many lessons were learned as a result of this particular exercise. The flexibility of commanders and Army Aviation soldiers alike will always be relied upon heavily in forming any type of task force successfully.

The Army Aviation soldiers of a light division strike force must be prepared to deploy and fight as part of a force package, task organized to participate in either peacetime maneuvers or armed conflicts. If these Army Aviation soldiers accomplish their tasks professionally and receive the same high level of command support as did the Thunderbirds, then no task will be too difficult.

Today, in the south of Thailand, when the word *Thunderbird* is heard, people remember. They see Hueys flying low across the Southeast Asian sky carrying the Queen of Battle on their backs.

On 16 October 1985, the 25th Combat Aviation Brigade was officially activated at Schofield Barracks (figure 3).

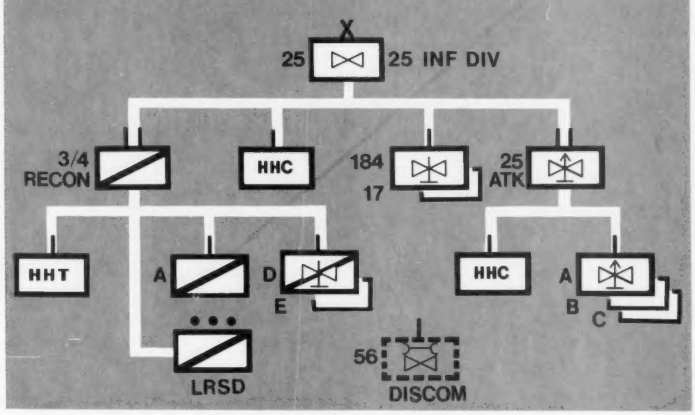
ABOUT THE AUTHOR

CPT Acker is a Senior Army Aviator. Previous assignments include 129th Assault Helicopter Company, Ft. Bragg, NC; Co A, 2d Aviation Battalion, Korea; flight instructor, Department of Flight Training, Ft. Rucker, AL. Currently he is the operations officer, 17th CAC, 25th Aviation Brigade, Schofield Barracks, HI. He holds a master's degree in business administration from Embry Riddle University.

Task Force 118 "Thunderbird"

Task Force 118 takes its lineage from the 118th Aviation Company. It was assigned to the 25th Combat Aviation Battalion following the Vietnam War. In March 1982, the 118th converted to D Company (ATK), 25th Combat Aviation Battalion. Under the 118th, the gunships were called Bandits and the slicks were the Thunderbirds. Credit for naming the task force goes to the former 25th Combat Aviation Battalion commander who served in the mid-1960s with the 118th. The actual 118th guidon, with battle streamers flying, deployed with the task force.

FIGURE 3: The 25th Combat Aviation Brigade structure.



Operator's Manuals and the User Reviews

Mr. Stephen M. Harris
Directorate of Evaluation and Standardization
U.S. Army Aviation Center, Fort Rucker, AL

EVER WONDER how changes to the aircraft operator's manuals are made? Most of the changes originate from you, the users. It is a process that allows the users to have a tremendous amount of input to the operator's manual using the DA Form 2028, Recommended Changes to Equipment and Technical Publications. User reviews are then scheduled to evaluate each DA 2028 to make the recommended changes to the operator's manuals.

The Literature Review Branch of the Directorate of Evaluation and Standardization at the U.S. Army Aviation Center is responsible for scheduling and hosting user reviews. Each year the Literature Review Branch holds an Operator's Manual Review covering entire aircraft manuals and respective checklists, and reviewing the DA 2028s that were submitted to the U.S. Army Aviation Systems Command (AVSCOM) in St. Louis, MO. The DA 2028s are reviewed for content, evaluated for acceptance and review notes are then consolidated into recommended changes, approved by the attendees present at the review and forwarded back to AVSCOM for coordination and printing. Final result — changes to the operator's manuals and checklists.

How do the DA 2028s, sent to AVSCOM, get to the Aviation Center? Good question. Thought you would never ask. In 1982, an agreement was reached between the two commands that allowed the Aviation Center to become the user representative and coordinate the users' desired recommended changes to the operator's manuals and checklists. In the Joint Operating Agreement between the two commands, responsibilities of each command are spelled out and it is AVSCOM's responsibility to send the DA 2028s to the Aviation Center for review. What this agreement basically allows is that the users in the field have a chance to voice their opinion on any future changes to their manual.

This past year, Operator's Manual Reviews for the UH-1, UH-60, OH-58, TH-55, OH-6, AH-1, AH-64, OV-1 and U-21 aircraft were held and attended by representatives from various commands. Some of the review notes are still being finalized prior to forwarding to the attendees for their approval, and then the recommendations will be sent to AVSCOM. This is important to you, the users in the field, for two reasons. The DA 2028s that you send to AVSCOM haven't been lost but are reviewed by pilots like yourselves, and changes to the manual and checklists will be coming out in the near future.

What can the users expect to see in the forthcoming changes? Everyone has surely seen the UH-1 (dash 10) format with the condensed checklists steps and simplified emergency procedures. The remaining manuals are going to be in the same format. Maintenance duplication has been deleted in preflight checks (where applicable); before start, starting and runup procedures are improved for faster mission response times, conservation of fuel and noise abatement around the airfields. All changes were studied with the following in mind: safety, simplification and comprehension. In other words, the checklists do not tell the pilot every widget on the aircraft to check and every door to open or close.

Other changes in the operator's manuals include standardization of format and content. A few examples of the many topics that have been deleted from the manuals because the information is covered in other publications such as the field manuals, field circulars and training circulars include:

- aerodynamics
- flight characteristics
- normal takeoff and approach descriptions
- hover and taxi descriptions
- instrument procedures and
- desert and hot weather operations.

That information which is unique to a particular aircraft remains.

The new changes to the manuals and checklists are exciting and should prove to be a great asset to the users in the field. It was users like yourselves who reviewed the DA 2028s and made the recommended changes to the operator's manuals in the interest of all users. When the new manuals and changes come out, review them and then make any recommended changes that you feel may improve the product further by submitting your DA 2028 through your commander for the next user review. Any questions regarding past user reviews can be directed to the Literature Review Branch by calling AUTOVON 558-4770/4603, FTS (205) 533-4770/4603 or by writing DES, ATTN: ATZQ-ESO-L, Ft. Rucker, AL 36362-5000.

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362-5000; or call us at AUTOVON 558-3504, FTS 533-3504 or commercial 205-255-3504. After duty hours call Ft. Rucker Hotline, AUTOVON 558-6487 or 205-255-6487 and leave a message.

Just Another FM?

The next war fought, some insist, will be a chemical war. Though some information indicates that Warsaw Pact forces have far exceeded North Atlantic Treaty Organization nations in chemical warfare training, the Army is preparing its soldiers to operate in a nuclear, biological and chemical environment as outlined in FM 1-102.

CW2 Blaine D. Pendleton
NBC Officer
82d Combat Aviation Battalion
82d Airborne Division
Fort Bragg, NC

WILL ARMY AVIATION units be subjected to nuclear, biological and chemical (NBC) weapons in future wars? If so, will Army Aviation be able to survive and continue its mission?

These two important questions are often not given the time and attention they deserve. The threat forces have answered the first question in their doctrine and training with an emphatic "*yes*!" The second question is up to us in Army Aviation. How would you answer?

As aviators we recognize the threat of enemy air defense systems and train accordingly. NBC weapons, on the other hand, are not given the same respect, which leaves a window of vulnerability for our enemies to exploit. Warsaw Pact forces have the capability to use NBC weapons unmatched by the North Atlantic Treaty Organization nations. Threat doctrine considers NBC to be of great importance in controlling the modern battlefield. They will use NBC weapons to harass, deny the use of terrain and break up logistics as well as to cause mass casualties.

The Soviets have 80,000 to 100,000 highly trained chemical personnel alone. They use actual diluted chemical agents during training. Their ability to

STATION 1 (left): *An AH-1 Cobra enters the decon site, and a ground guide directs the aircraft to the first station where it is checked for contamination.*

STATION 2 (below): *At station 2 an AH-1 Cobra's affected areas are scrubbed with brushes and hot soapy water.*

operate in an NBC environment and their decontamination equipment (such as the TMS-65) also are unmatched by us. Would they use this advantage? Some reports indicate they used it against unprotected Afghans by dropping blister agents, nerve agents and Yellow Rain (T-2 toxin)! For further information on Soviet operations and tactics see FM 100-2-1.

Aviation units have two primary areas of concern in NBC defense: the ground support areas for logistics and maintenance; and, aircraft flying in an NBC threatened battlefield. Until recently, we have had few publications addressing aviation peculiar problems such as the use of decontaminants on aircraft. To fill this void the Army has given us FM 1-102, "Army Aviation in an NBC Environment," which was put into distribution in October 1984. It addresses these problems and offers a lot of worthwhile solutions.

D Company, 82d Combat Aviation Battalion, was given a copy of the coordinating draft for FM 1-102 and put it to use. During a relief onstation mission, scout attack teams (SATs) are rotated from the engagement area through the forward arming and refueling point (FARP).

This is usually done by dividing the attack company into three SATs: one SAT is engaging, another is in the FARP and the third is en route to or from the FARP. The purpose is to keep sustained fires on the enemy.

Timing is critical. If a bottleneck occurs at the FARP, friendly ground forces could be left without supporting fires. Aircraft returning to the FARP with persistent chemical agents on the fuselage would cause such a bottleneck. But D Company overcame this problem by using a partial decontamination station as outlined in the coordinating draft.

The decon site was set up geographically separate from the FARP with help from the 21st Chemical Company. We put blotches of water paint, to simulate chemical agents, on areas of the aircraft that the FARP people would need access to. Upon entering the decon site, aircraft were ground guided to the first station where they were checked for contamination. At the second station the affected areas were scrubbed with brushes using hot soapy water, and at the third station a hot washing soda solution was used. At the fourth and final station aircraft were rinsed using pressure hoses from a 65-gallons-per-minute pump, and then rechecked for contamination before continuing on to the FARP.

We found no need to dry the aircraft with Herman Nelson heaters. The flight to the FARP took care of that. At every station there was a team leader who ground guided the aircraft into position and acted as safety noncommissioned officer.

The aircraft were left at engine idle at each station and were able to rotate through all four stations in as little as 12 minutes! The operation was a complete success with many valuable lessons learned.

Through proper and realistic training, and using FM 1-102, Army Aviation units can greatly increase their effectiveness in an NBC environment; and *effectiveness is what readiness is all about!*

STATION 3 (left): *At the third station a hot washing soda solution is used on an AH-1 Cobra.*

STATION 4 (below): *At the fourth and final station the AH-1 Cobra is rinsed using pressure hoses and then rechecked for contamination before being directed to the FARP.*

Dr. Herb LePore
Historian
U. S. Army Aviation Center
Fort Rucker, AL

A VIEW FROM MOUNT OLYMPUS

A historical look from the top confirms Army Aviation is indeed "Above the Best!"

WHERE HAS the time gone! The United States Army Aviation Branch was 3 years old on 12 April 1986. At this time, we can ask ourselves what have we accomplished as a branch and what have we learned?

First, we have accomplished a sense of dignity. We are for real. Time and three wars have tried and tested us. The accolades and honors tendered to us have been tempered by the blood and sacrifices of many of our aviators in these wars and in the memory of what they did to help preserve our heritage and our country. Also, the history and uniqueness of the machines flown in three wars by our Army aviators has brought respect not only from our enemies, but also from our detractors—many of whom said we could not ever give justice to the missions we as aviators were asked to perform. Not only did we do justice to our missions, but we added new dimensions of greatness to our Nation, the Army and to what later would be our branch.

Second, we learned that greatness and pride were ingredients that came not automatically, but in many instances as the result of great sacrifice, determination and at times, great suffering. To some our doctrine and the way we performed our mission seemed anything but effective or practical. We were told, "It could not be done." And at times, we almost believed what we heard. However, there were those in Army Aviation who exhorted us to try harder, and if necessary, to do the seemingly impossible. Somehow, we found an indomitable spirit or will that drove us harder, faster and farther than we thought humanly possible.

Third, we found that the people who made up the fraternity of Army Aviation were imbued with a purpose and will to make our branch truly, "Above the Best." They did not ask for special privileges or favors, nor did they expect any. All they asked for was the opportunity to use their skills, imagination, determination and pride in what they were doing to make Army Aviation an important and contributing element of the combined arms team. They have done this and continue to do so.

Fourth, we in Army Aviation have become "historically minded." Time has given us the opportunity to know and appreciate our heritage and from our past the many lessons learned. We have come to know names, places, events and those soldiers, by whose measure, contributions and sacrifices we owe so much. Above all, we have come to know the intangibles, such as love of country, pride in our organization and ourselves, and loyalty to those with whom we serve—all of which has enriched our history and enhanced our appreciation of it.

Fifth, and finally, we know our future will not be spelled out by the building of large and impressive edifices, nor by the esoteric and sophisticated machines we fly, but by a belief in what we do and whom we represent, and by those viable programs that will enhance our training and capability to perform our mission—whatever it may be. Above all, we will continue our close cooperation and coordination with our counterpart branches, all of whom have contributed much to our success. We are Army Aviation.

AVIATION PERSONNEL NOTES

FROM FORT RUCKER

Mr. Roland Weldon, Chief, Enlisted Training Section, Individual and Unit Training Division, Directorate of Training and Doctrine, U.S. Army Aviation Center, Fort Rucker, AL

Aviation Branch—Enlisted Update

Since implementation of the Aviation Branch, the enlisted ranks have undergone a number of changes and still others are being proposed. A major change has been the "toughening" of the advanced individual training (AIT) courses. Other changes and proposals include: new military occupational specialties (MOSs) 93B (Aeroscout Observer) and 93D (Air Traffic Control Systems/Subsystems Equipment Repairer); a new resident basic noncommissioned officer (NCO) course (BNCOC); the consolidation of MOSs 93H and 93J; and, the transfer of air traffic control and avionics maintenance training to Ft. Rucker. Each of the changes/proposals is discussed below.

Toughening of AIT Courses. For almost 2 years now, toughening of AIT has been a reality. What it amounts to is the 30 tasks that constitute basic training are being reinforced through the soldierization process and through field training exercises (FTXs). The local cadre conducts the soldierization training while instructors terminate the AIT courses with FTXs of several days' and nights' duration. In the FTXs, scenarios integrating newly acquired MOS skills with those of combat survival are used to prepare soldiers for their first field assignment. As a result of this reinforced training, we have a leaner and better trained soldier; one who "can hit the ground running."

New MOS 93B, Aeroscout Observer. This new MOS will replace additional skill identifier (ASI) 67VZ1. The 67VZ1 course will continue to be taught at Ft. Rucker until 1 October 1986. At that time, the AIT course will be implemented providing an individual with an MOS of 93B. It will include 67 hours of in-flight training. The length of the new AIT course will be about 15 weeks.

New MOS 93D, Air Traffic Control Systems/Subsystems and Equipment Repairer. 93D is a new MOS that consists of the old 26D with air traffic control radar maintenance added. Further, it joins the 93B, 93H, 93J and 93P to make up the new career management field (CMF) 93. While proponency for the 93D rests with the Aviation Center, the training is still accomplished at Ft. Gordon, GA. Plans are to move this training to Ft. Rucker during the 1988 to 1992 timeframe.

Consolidation of MOSs 93H and 93J. Consolidation of 93H and 93J has been under study for some time. The prospects of it happening are good. An 800 page study, containing blueprints for the consolidation, has been completed and is being staffed. Milestones are tentative, but the hopes are for Department of the Army (DA) approval in May 1986 and reclassification of personnel in the new MOS to start 1 October 1987. Units will use transition packages made up of correspondence courses and training extension course lessons to qualify soldiers for the new MOS. Soldiers unable to qualify before 1 October 1987 will have until 1989 to do so. However, this is still a plan and one that has not been approved by DA to date.

Establishment of New Resident Basic NCO Course. In July 1985, the commanding general, U.S. Army Training and Doctrine Command, decided the training strategy for combat support MOSs should be the same as that for combat arms. This meant eliminating the skill level (SL) 2 primary technical courses (PTC) and changing the SL3 basic technical courses (BTC) to BNCOCs. Since the Aviation Center does not have resident SL2 or SL3 courses, both the PTCs and BTCs for 93H, 93J and 93P have been presented as correspondence courses. These PTCs and BTCs were phased out in February 1986 and signaled the start of the new basic NCO correspondence course. In June 1987, the new resident BNCOC is expected to begin.

Transfer of CMF 28 Avionics Training to Ft. Rucker (MOSs 35K, L, M, P, R). While 93D maintains the air traffic control equipment, the MOSs in CMF 28 maintain the systems in the aircraft. Four of these MOSs do the work and merge with MOS 35P at the SL3 supervisory level. Like the 93D, these highly technical MOSs are still trained at Ft. Gordon. Plans are to move this training to Ft. Rucker also, in the 1988 to 1992 timeframe.

FROM MILPERCEN

Aviation Technical Inspectors Needed

The Aviation Enlisted Career Management Branch is seeking NCO volunteers in the grade of sergeant, in the 67 series MOS and MOS 68J, for training and assignment as aircraft technical inspectors.

Qualification for this training is outlined in AR 611-201 and includes the following:

- A physical profile limitation of no more than 222211.
- Normal color vision.
- Have at least 18 months experience in the appropriate MOS at skill level two.
- No history of alcohol/drug abuse.
- Be qualified for reenlistment.

Graduates of the course who are awarded a 66 series MOS will incur a service obligation as listed in AR 614-200. Contact your local military personnel office (MILPO) for information regarding obligation.

Applications should be submitted on a DA Form 4187 through the unit commander and MILPO to: Commander, MILPERCEN, ATTN: DAPC-EPT-F, 2461 Eisenhower Avenue, Alexandria, VA 22331-0400.

All training is funded by MILPERCEN. Soldiers may attend the course on a temporary duty and return basis, or in conjunction with a permanent change of station move.

For more information, call MSG Walter Cole or SFC Randy Newman at AUTOVON 221-8322 or 221-8323.

Just The Facts

I have been hearing terms such as single tracking and dual tracking for officer career patterns. What are they?

The revised Officer Personnel Management System provides two career tracks, or career patterns, for officer development. They are single track and dual track.

A single tracked officer has only one career field—either a branch or a functional area. Dual tracked officers will have two career fields—a branch and a functional area.

Is single tracking permitted in all branches and functional areas?

Single tracking is permitted in all branches and functional areas *except* functional areas 18 (Special Operations), 48 (Foreign Area Officer), 50 (Force Development) and 54 (Operations, Plans and Training). The proponents for these functional areas have determined that branch experience, through dual tracking, is vital to professional development and, therefore, single tracking in these functional areas will not be permitted.

Are you saying that combat arms officers may single track in their branch?

Yes. However, to meet the large number of Army requirements at the field grades, especially in the functional areas, only a small number of combat arms officers will be allowed to single track in their branch. Combat arms officers who request to single track must be aware of the potential assignment and professional development limitations that single tracking in a combat arms branch presents. Specifically, officers who single track in a combat arms branch will be considered for assignment to positions coded for their branch, for branch immaterial (01A) and combat arms immaterial (02A) only. This will preclude assignment to positions such as brigade and division S1/G1 (coded 41) and S3/G3 (coded 54).

Who will decide career patterns for officers?

Officers will be given an opportunity to state their preferences for a career track during the functional area designation process during the seventh year of service. This process will be conducted by MILPERCEN and will be similar to today's additional specialty designation process. The number of officers who will be permitted to single track in a branch or functional area will be determined by the branch or functional area proponent's desires for a single track population and Army requirements.

For dual tracked officers, who will decide whether an officer will serve in a branch assignment or a functional area assignment?

This is an assignment decision that will be based on professional development consideration and the needs in both the officer's branch and functional area, the officer's qualifications, the number of requirements that the officer's assignment branch and functional area are required to meet, and the individual officer's desires.

Can an officer request to single track at any time during his or her career?

Yes, anytime after 7 years of service. An officer's preference for a tracking option will be solicited by MILPERCEN during the officer's seventh year of service.

ABOVE THE BEST

CW3 Tholan Crosby

There I was at 9,000 feet . . . . Thus begins the typical war story of a veteran Army aviator. Chief Warrant Officer (CW3) Tholan Crosby of Corpus Christi Army Depot's (CCAD's) Aviation Office at Corpus Christi, TX, can dish it out with the best of them. But, this story about him is true, and it didn't happen during the war.

CW3 Crosby was awarded the Broken Wing and an Army Achievement Medal for actions he took while flying a U-21 Ute over South Bend, IN.

Bill Angle, Army Aviation safety officer for the depot, said that this is the first time in CCAD's history that one of its aviators has been awarded the coveted Broken Wing. An average of 35 of these safety awards is given each year to crewmembers who recover an aircraft from an in-flight failure or malfunction necessitating an emergency landing.

CW3 Crosby, the pilot in command, and Major Harold N. Gibbs, copilot, were flying the twin engine turboprop airplane on a mission to South Bend. Five other depot employees were also onboard. They were preparing to land when they realized that the number two engine's power level was frozen at cruise speed and could not be retarded.

Major Gibbs, who had been controlling the aircraft when the discovery was made, continued to fly while CW3 Crosby attempted, by various means, to loosen the throttle. When these attempts failed, they notified the controller at Chicago Center that they had a "problem" and started their descent through the cloud layer.

At this point, CW3 Crosby took control of the aircraft and broke out of the cloud cover at 3,000 feet. He flew over the runway to get a good look at the conditions under which he would have to land.

It didn't look very good; in fact, it looked pretty bad. The runway was packed with ice and snow, and a 20-knot, 50-degree right crosswind made matters even worse.

CW3 Crosby shut off the right engine and entered a right, downwind traffic pattern. Airport authorities were ready for them should they encounter more difficulties in landing.

CW3 Crosby landed on the icy runway, unable to use the airplane's brakes because of the danger of skidding. He allowed gravity to bring the U-21's speed down to the point at which he could safely apply the brakes.

And, that's all that happened. No one was injured; the plane remained undamaged; the mission was accomplished; and CW3 Crosby and Major Gibbs got to tour the Notre Dame campus as they had hoped to do.

That's why CW3 Crosby got the award: Because of his calmness under stress and his exceptional ability to fly the U-21 under adverse conditions, *nothing happened.* As it turned out, moisture inside the power control cable in the power lever froze in the below zero temperatures. The cable was temporarily repaired at South Bend and replaced when the plane got back to the depot.

When asked what he thought about the incident, CW3 Crosby replied, "As Major Gibbs and I went through all the engine shut-down procedures, we realized that there is no procedure to follow for a stuck throttle. But this is the kind of thing you practice for throughout your flying career. When it finally happens and you get through it all in one piece, it gives you a really good feeling about yourself."

Views expressed herein are not necessarily those of the Department of the Army nor the U.S. Army Aviation Center.

This article covers elements we consider key to a viable and productive Army Aviation maintenance program from a management standpoint. The items discussed are not all-encompassing, but if instituted may have a positive impact on your maintenance program

AVIATION MAINTENANCE PROGRAM

Colonel Jerry T. Wagner
Lieutenant Colonel Mike Pulliam

TO HAVE A successful maintenance program you must initially establish objectives which exactly define what you want to accomplish in the maintenance arena. Your goals must be stated in basic terms that can be understood by every soldier. The objectives listed below are in simple terms and probably not unlike those of other aviation units.

Maintenance Objectives.

- Provide quality safe maintenance for all categories of aircraft.
- Provide sufficient aircraft to support tactical missions and aircrew training manual requirements.
- Meet Department of the Army operationally ready standards for availability.
- Reduce number of not mission capable (NMC) aircraft over 30 days.

Key Elements of the Maintenance Program.

The following items are not all inclusive but they should be considered keys to the success of any maintenance program. They are ideas and concepts that can be instituted, but must be frequently reviewed for modification and refinement.

Long/Short Range Planning. After an analysis of many programs, you often may determine that management by crisis is the rule rather than the exception in day-to-day maintenance. To decrease the incidence of "crisis management," you should advise the maintenance people of your unit's training plans. Use a long-range calendar that projects 18 months out, and a 6-month working calendar for short-range planning. Familiarizing people on the maintenance side of the house with all future unit activities enables them to properly program the maintenance effort. They can anticipate heavy requirements and gear their programs to meet the demand.

Long-range planning also facilitates management of critical military occupational specialty skills in terms of programing unit absences for leave and schools, resulting in better use of these people during peak maintenance periods.

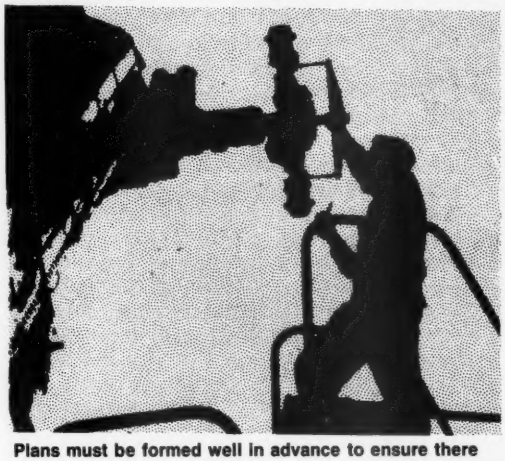
Planning post-deployment maintenance also is important. Projecting a work schedule during this phase of training precludes extended downtime during recovery periods after major field exercises and unusually high support requirements either on or off post. Another obvious benefit from this type planning is that it gets you well on your way toward supporting the next big training event.

Reverse Cycle Shifts. During critical maintenance periods divide your resources to provide around-the-clock maintenance. Form a night crew and direct its efforts primarily toward phase maintenance, although some unscheduled work can be accomplished when needed. The night shift enjoys a basically uninterrupted work period, free from normal duty hour distractors. Plans must be formed well in advance to ensure there will not be any unavailable parts that could cause a work stoppage during the night. This concept promotes phase team continuity and results in faster, better quality phases. Experience proves that the optimum time for employment of the night crew is 5 to 6 weeks before changing crews.

Maintenance Coordination Meetings. Close coordination and communication is vital to any overall battalion maintenance effort. Personal contact should be made at company level with the company maintenance officer, operations officer and flight platoon leaders to discuss aircraft scheduling and to establish work priorities based on mission load. The battalion should conduct weekly meetings to provide interface among the companies for problem solving and mutual assistance. During these meetings, parts lists for NMC aircraft are exchanged for lateral search, controlled substitution decisions are made and weekly battalion priorities are established.

Also, the battalion can organize monthly maintenance breakfasts attended by commanders and key maintenance officers and noncommissioned officers. This informal setting provides the opportunity for maintenance people to get to know each other better and to improve working relationships. A breakfast agenda can include a review of internal policies and procedures, recent changes to maintenance publications, and the introduction of new ideas that can assist the maintenance effort.

Prephase Inspections. A thorough inspection of each aircraft should be conducted about 25 hours prior to phase. This allows early identification of parts requirements and detects potential problems that may arise during the phase. Also, routine parts should be placed on order to effect



Plans must be formed well in advance to ensure there will not be any unavailable parts that could cause work stoppage during the night.

receipt coincidental to phase initiation.

During the prephase inspection a determination also can be made of upcoming time before overhaul requirements. If numerous or historically hard to get components must be changed, an analysis should be made of upcoming training events to determine the most favorable window for phase initiation. The aircraft can then be either continued in mission status and flown down to meet the window or used sparingly in order to bypass it with another aircraft with a less complicated phase. This management principle allows the more difficult phases to be programed when the unit can most afford it.

Imminent time change components also can be placed on the normal aircraft flow chart, which allows the maintenance officer to track for the coming changes on a daily basis. The component may then be ordered anticipated not mission capable supply (NMCS) against the aircraft in an attempt to have the part in hand at the next scheduled maintenance interval or when the component is due a change. However, extreme care should be exercised when ordering aviation intensely managed items anticipated NMCS because of the limited time the unit is authorized to have the item on hand. If the system is used properly, this principle will save valuable NMC time.

Class IX* Management.

Even the best maintenance management systems will not work unless someone has the ability to requisition and receive repair parts in a correct and timely manner. Although the repair parts system has been vastly improved over the years through computerization, it also requires that people who use the system understand it completely. An attempt to continuously upgrade the training level of your prescribed load list clerks must be made through installation-level certification courses and periodic classes at the battalion level.

*Class IX: Repair parts and components to include kits, assemblies and subassemblies — reparable and nonreparable, required for maintenance support of all equipment.

Because of the dynamic nature of the instituted DS4 (direct support standard supply system), it is increasingly important to provide frequent updates for user personnel, particularly those who received their initial training under the division logistical system. Battalion S4s can be designated as primary trainers for this purpose. They should maintain close liaison with the Class IX division materiel management center through frequent coordination visits. By doing so, they become familiar with changes as they occur and can pass these changes to unit level through information meetings and training sessions. This liaison also makes it possible for S4s to identify systemic problems such as causes for rejection. It also allows the S4s to take corrective action immediately. This will help to effectively reduce long lead time for parts by placing the requisition back in the system almost immediately.

Controlled Substitution. Occasionally, parts may be removed from aircraft with projected extended downtime to quickly repair other NMC aircraft. Controlled substitution can only be performed at maintenance levels that are authorized to repair or replace that particular item. This principle also can be employed to preclude unnecessary partial mission capable time on otherwise fully mission capable aircraft. However, the controlled substitution program offers greater flexibility if *managed at battalion* level. In other words, *intercompany substitution is used* to improve the battalion maintenance readiness posture. Proper paperwork must always precede any substitution and the program must be monitored continuously to derive maximum benefit.

Innovative Concepts. A continuous indepth review of current maintenance concepts should be made to better use existing assets. In addition to the aforementioned reverse cycle shifts, people also can be used from the aviation intermediate maintenance (AVIM) company to assist line units in phase completion. Rather than work order the aircraft to the AVIM company, a maintenance team can be attached from AVIM assets to conduct an onsite phase at the line unit. This makes the phase team responsive to the needs and priorities of line unit commanders

and provides them with a battalion asset that may have been otherwise used during a slack period.

Another concept is to form scheduled and unscheduled maintenance teams from within company assets with stated objectives for each. This division of responsibility allows each team to concentrate on a specific area or a specific aircraft, and provides day-to-day continuity in the completion of work.

Effective Awards Program. A *comprehensive* awards program concentrated on the enlisted soldier is effective. Recognition of exceptional performances and dedicated service demonstrates to soldiers that their efforts are appreciated. It also provides them with an incentive to excel. Awards must be presented in a timely manner to accomplish desired effects.

A good awards program can include both company and battalion awards for crewchief and aviation mechanic of the month. Monthly winners could then compete in their respective categories for battalion quarterly awards. Trophies and certificates should be presented to all winners. Also, the names and units of monthly winners can be engraved on a battalion plaque that would remain on permanent display at battalion headquarters. The battalion commander could personally sign each certificate, thereby providing promotion points to the deserving soldier as well as appropriate recognition.

The battalion also could design distinctive unit certificates of achievement and recognition which could be awarded for other individual achievements. Effective use of Department of the Army Certificates of Achievement, letters of commendation/appreciation, and of course the Army awards program also can be used.

At the monthly battalion muster formation, winners could be recognized in front of their peers. In addition to the awards, the battalion commander could publicize the battalion's maintenance achievements for the previous month and thank the soldiers for their individual contributions to the success of the unit. This high-level recogni-

Mechanics perform aviation intermediate maintenance on a UH-1 helicopter.

tion will provide soldiers with tangible results of their labor and reinforce the fact that individual effort has a tremendous impact on overall mission accomplishment.

Command Interest. One of the real keys to bringing a total maintenance program together is command interest. Commanders and leaders at all levels must demonstrate genuine personal interest in the maintenance program. The battalion commanders should visit each company aviation maintenance section on a daily basis to ascertain current status and to discuss problems and short-range plans. Also, they should visit the battalion aviation maintenance offices to ensure that individual company efforts are in consonance with those of the battalion. This active involvement will graphically demonstrate to everyone concerned that the maintenance program is of vital interest and importance.

Also, daily maintenance status reports could be provided to battalion commanders and executive officers for review. This would also afford a daily look at the overall picture and can be closely scrutinized to ensure that all possible options to improve the readiness posture have been exercised.

Intangible Factors. The part that intangibles play in the accomplishment of any mission or program has been discussed at length at all levels of command and staff in the Army. Suffice it to say that the presence or absence of these factors has tremendous impact on the capability of any unit.

Mission Oriented. Mission accomplishment should be stressed in everything. The emphasis should not only be to accomplish the task, but also to perform it to the highest of standards. This attitude should be applied to the small, seemingly unimportant tasks, as well as the collective, more visible undertakings. This sense of accomplishment and desire to excel in day-to-day actions will carry over into the maintenance arena and should have a positive effect.

Pride/Esprit de Corps. Building pride and esprit de corps cannot be accomplished overnight. It can be achieved only by the conscientious application of sound management practices, basic leadership principles and a genuine interest by the chain of command over a sustained period of time. Establishing pride in the unit should be accomplished before building individual prides in the soldiers.

Since job satisfaction is key to realizing the full productivity of the soldiers, the importance of individual functions to the accomplishment of the overall mission can be recognized through the aforementioned awards program and publicized maintenance accomplishments. Successes will develop pride through a feeling of accomplishment, and esprit de corps will be a natural byproduct of the process.

Teamwork. Working as a team may well be the most important factor in achieving success in the maintenance program. It is absolutely essential that everyone work toward the same objective in a spirit of total cooperation. Developing the team concept from a battalion standpoint should enable units to accomplish maintenance goals that may have been unattainable in an uncoordinated environment.

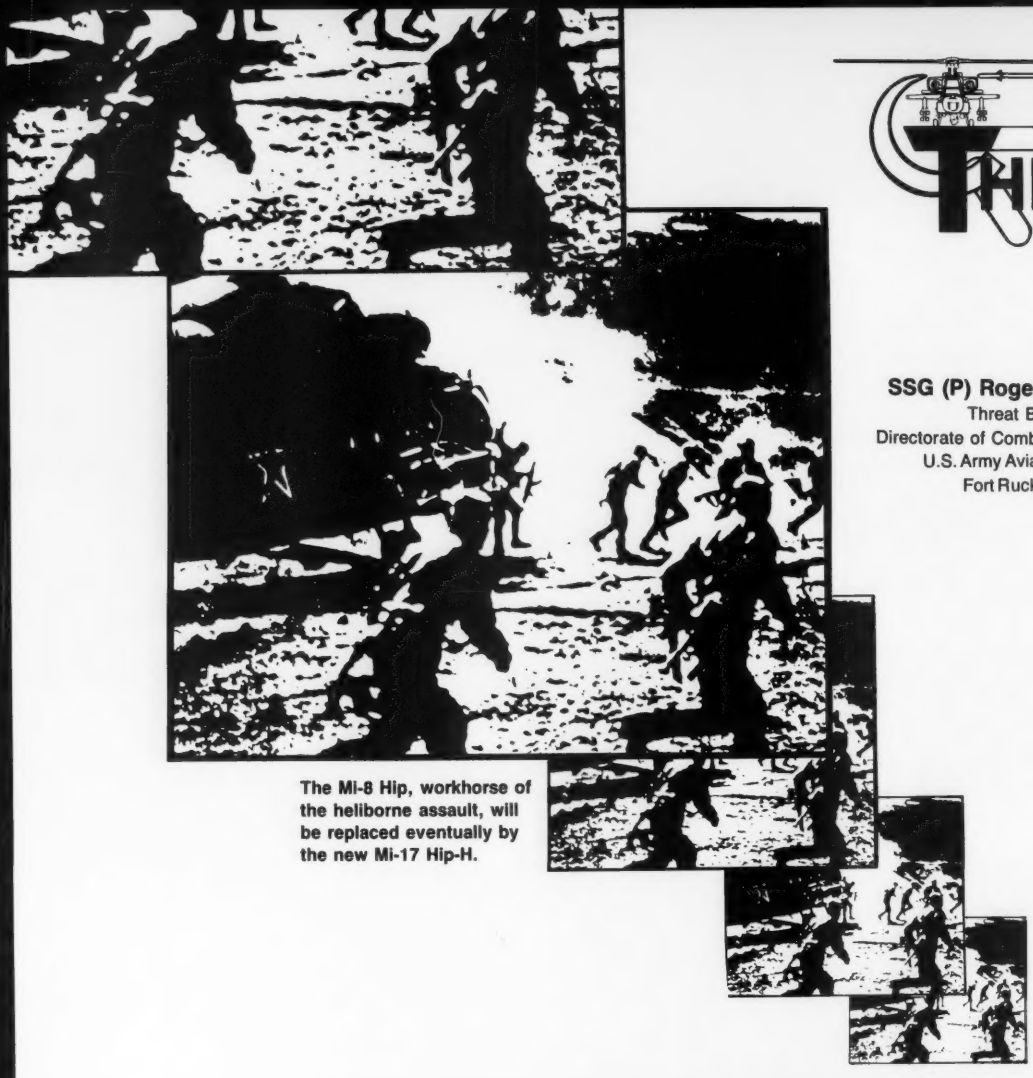
Healthy Command Environment. Providing a good working atmosphere with open communication at all echelons is paramount to developing a maintenance program that provides the flexibility to meet changing demands. Freedom to fail encourages experimentation with new and innovative concepts that may open previously unexplored approaches to getting the job done.

Managing many aspects of a maintenance program at battalion level will actually enhance the command environment. It can promote cooperation among subordinate units by eliminating unwanted competition. It also will reduce the pressure that stems from a fear of being compared to a similar unit. As a result, units are able to direct all of their competitive spirits toward achieving their stated objectives.

Safety First — Teamwork Always!

ABOUT THE AUTHORS

COL Wagner is scheduled to assume command of the 1st Cavalry Division CAB at Ft. Hood, TX, in July 1986, and LTC Pulliam commands the 52d Aviation Battalion, APO San Francisco.



THREAT

SSG (P) Roger W. Jacobs
Threat Branch
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

The Mi-8 Hip, workhorse of the heliborne assault, will be replaced eventually by the new Mi-17 Hip-H.

VOZDUSHNYY DESANT

The following article depicts a Soviet battalion in its mission to capture an American airfield and destroy their worst enemy—American helicopters.

MAJOR BOROKOV walked among his men as they made final checks of their weapons. He knew they were ready for this mission. They had been through rigorous training beginning with the challenge of ground training at jump school. After earning the coveted parachute badge, they were assigned to his battalion in the air assault brigade. Here they encountered a program of road marches, weapons training, tactics in using the BMD vehicle (mobile airborne assault guns) and in helicopter operations. The months of training were about to pay big dividends.

As commander of the 3d Assault Battalion, Borokov had supervised the loading of the battalion's BMDs onto the new Mi-26 Halo helicopters earlier in the evening. Everything had gone smoothly and the equipment would arrive just minutes after the troops.

In stick order, the battalion ran out to the waiting Mi-8 Hip helicopters as Mi-24 Hind gunships circled above, ready to escort the transports to the landing zone (LZ). During the helicopters' climb to flight altitude, the major mentally reviewed the brigade's assault plan.

The parachute battalions had staged on a different airfield. The komanda desanta, or advanced assault reconnaissance group, was the first unit to be dropped in. It was a reinforced company from the 1st Parachute Battalion charged with securing the drop zone/landing zone, making all necessary signal markings and checking weather conditions. Following after them would be the remainder of the 1st Battalion and all of the 2d Parachute Battalion. Once on the ground, they would begin to move toward the objective on foot.

The parachute troops should be in position when we touch down, MAJ Borokov thought to himself. Then we will make a mad dash with our BMDs, and the assault should carry the enemy position.

The objective, he mused, was an airfield. Once the BMDs broke through the airfield perimeter, the parachute troops would move to capture the enemy ammunition and supply areas. The dismounted BMD troops would mop up final resistance while the BMDs themselves would continue on to the flight line to secure the helicopters. Hopefully, the American helicopters would all be caught on the ground. MAJ Borokov knew that the first 45 minutes were the most dangerous for his men. Any enemy action, especially a counterair assault or attack by helicopter, would disrupt the whole operation. The mission of capturing the American airfield would yield a dual benefit. Not only would a suitable area for resupply be secured, but those nuisance helicopters also would be eliminated in this area. They were 5 minutes from the LZ and no enemy aircraft had been encountered. All was going well.

As the Hips touched down, the 3d Battalion sprang to the ground and dispersed to the LZ perimeter to await the arrival of the BMDs. At the sound of approaching rotors everyone crouched lower, ready to repel an enemy counterstroke. It turned out to be the Mi-26s. Crews quickly ran to the incoming helicopters and in minutes the huge "birds" had departed, leaving a number of BMDs now speeding off the LZ.

The battalion paused about a kilometer from the airfield for MAJ Borokov to confer with the reconnaissance elements. The enemy had been alerted by the noise of the helicopters. The attack must take place immediately before the enemy helicopters could take off!

The BMDs lunged forward as explosions split the darkness. In seconds, they were at the airfield perimeter. The small force providing airfield security was collapsing. A few AH-1 Cobras and AH-64 Apaches had managed to take off but, as they made their attack runs, they were

caught in a deadly crossfire. BMD-2s in overwatch positions fired their 30 mm cannons, SA-7 Grail surface-to-air missile teams found the range, and antitank guided missile teams did their best to join in. Suddenly, Hind gunships appeared! In moments, the airfield was in Soviet hands.

MAJ Borokov immediately had his men prepare defensive positions. The remainder of the brigade was brought in from the LZ to bolster the defense and to make the airfield ready for follow-on equipment and supplies. ZU-23 antiaircraft guns were put in place to reinforce the air defense. The brigade did not sit idly by and wait, though; the recon teams were already moving through the darkness to seek out the enemy.

The purpose of this story is not to make the Soviets look 10 feet tall. They are not. Rather, it is to make the reader

Soviet troops with AK-74 assault rifles and RPG-16 grenade launchers land next to BMD-1 airborne amphibious infantry combat vehicles. Soviet airborne and air assault troops wear the same distinctive uniforms and use much of the same equipment.

aware of the threat posed by air assault and airborne units to Army airfields.

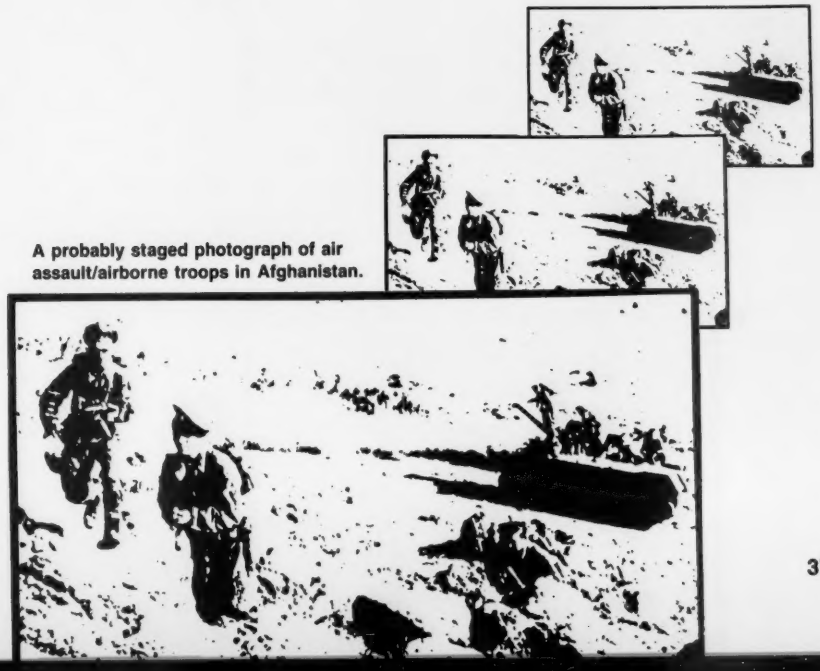
These units are well-trained and well-equipped. They have a nasty habit of showing up in unexpected places at odd hours. They specialize in surprise. Their equipment, like the BMD and ZU-23, is optimized for their role. Among the Soviet airborne/air assault stated missions is the capture or destruction of enemy airfields. Since the helicopter is one of their more prized weapon systems, they believe the U.S Army feels the same way about its helicopters. U.S. airfields will enjoy a high priority on their hit list.

The Soviets do have weaknesses, though. They are a conscript force and there is some evidence that the young Soviet of today does not like military service. The airborne and air assault forces may be more heavily mechanized than comparable U.S. units, but they are still prone to suffer from the same liabilities that any force of this type faces. They are especially vulnerable during flight and landing operations. Soviet tacticians realize that their air-delivered forces are most vulnerable during the first 45 minutes on the ground. Units are forming, equipment is being derigged and the fewest men are available for defense. For these reasons, any counterstroke violently and audaciously pressed will destroy their timetable and allow some time to either counterattack in force or to take other countermeasures.

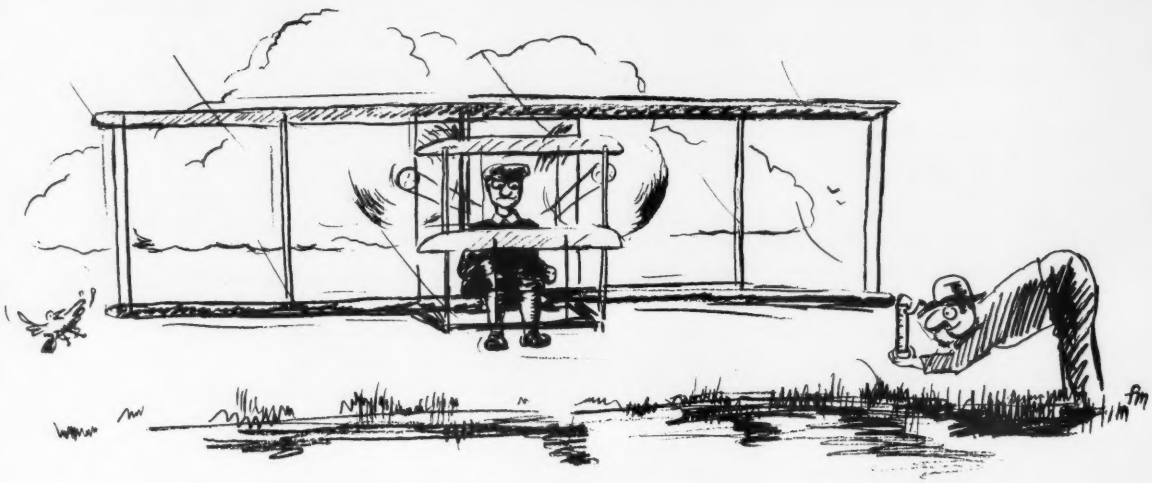
According to Soviet doctrine, ground forces must link up with an air assault *20 to 40 kilometers behind* the forward edge of the battle area within 12 hours. For this reason, as soon as an air assault or paradrop is detected, every effort should be made to stop the linkup. This can be problematical. The air assault has to be contained while the ground force attacks also must be stopped. If the linkup can be halted, the air assault will be forced to depend on air-delivered supplies and can be defeated.

In many respects, helicopters are our own best defense. An attack by armed helicopters or a counterair assault could destroy the operation. Rapid deployment of forces by helicopter, supported by armed helicopters and Air Force A-10 fixed wing attack fighters, would facilitate isolation of the assault force and reinforcement of front line units to halt the ground force advance.

Soviet air assault and airborne forces are a formidable enemy. They are well-trained, mechanized and mobile. They pose a serious threat to U.S. Army airfields. However, the Soviets can be defeated with quick, decisive action. In the case of Army Aviation, their objective, the helicopter, is also the means of their defeat.



A probably staged photograph of air assault/airborne troops in Afghanistan.



Flight Simulator Sickness

Mr. Ernest Webb Rickenbacker

When this article was written the author was assigned to the Department of Aviation Subjects, Flight Simulator Division, Worldwide Software Support Branch, U.S. Army Aviation Center.

Since the days of Kitty Hawk and the accomplishment of the first manned flight of a powered aircraft by Orville Wright, aviation and aerospace research and development have taken tremendous strides. However, these extraordinary achievements have been costly in both dollars and lives. The monetary expenditures have been colossal, and the loss of human life has been traumatic.

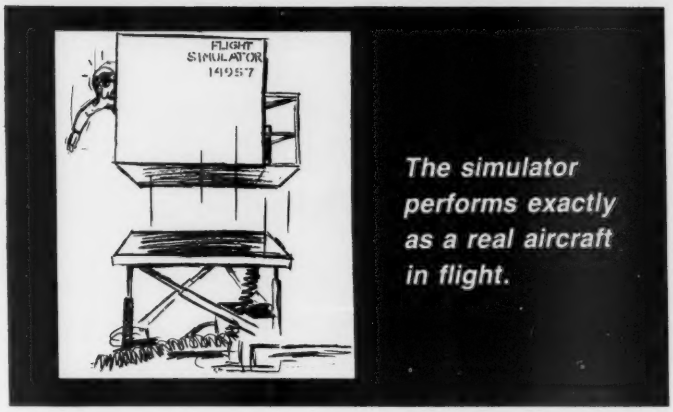
THE INTRODUCTION of the flight simulator has indeed met the challenges of the rapidly growing aviation and aerospace industry by significantly curbing the loss of lives and dollars. Despite remarkable advances in the development of flight simulators, a twinge of dissatisfaction in their use still plagues the executives and en-

gineers of the simulator-producing industry. The desire for more sophisticated and technologically advanced simulator systems drives the industry in a relentless search for a means of satisfying the consumer. In the market outcry for a better system, the words "realism" and "accuracy-of-flight-portrayal" prevail.

An element somewhat disregarded as insignificant is the fact that many crewmembers, using the various flight simulators available, complain of experiencing a sort of "airsickness" after having been exposed to a period of flight training. This uneasy after-effect fosters a distrust for any future encounters with flight simulator systems or anything which faintly resembles them. Additionally, the distrust has a positive effect on the degradation of training and the development of negative-habit transfers when faced with the actual aircraft in a real-world environment.

When aircrews announce an encounter with airsickness after a training period in a simulator, it should trigger the question: How can crewmembers experience airsickness when they never left the ground to begin with? The most rational answer is simple. The simulator performs exactly as a real aircraft in flight. But one factor may prove this to be a highly irrational conclusion. If the simulator contributes to any imbalance of the human physiological senses that are not normally experienced in actual flight, airsickness becomes a misnomer and "simulator sickness" more substantially applies. The insidious effects of simulator sickness were first recognized in 1957, and studies on its effect on the human factor continue to this day.

People have been known to adapt to constantly changing environments throughout history. It is often stated that acceptance to change and adaptation to abnormal experiences is a necessary part of survival. But researchers do not believe that adaptation to simulator sickness is a satisfactory solution, based upon the fact that abnormal responses to sense stimulation (depending on magnitude and duration) can carry over to the real world. This transfer of abnormal responses is undesirable when an individual is required to operate machinery or a motor vehicle. In short, it could be dangerous—even catastrophic.



The Physiological Senses

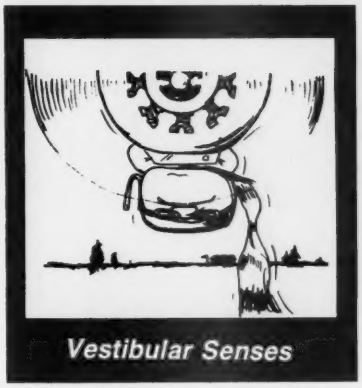
Vestibular Senses. The vestibular apparatus is located in the temporal bone on each side of the head and is the motion and gravity sensing organ. Each contains two distinct structures, the vestibule proper and the semicircular canals.

The vestibule houses the otolith organ which normally responds to gravity; changes in head position relative to gravitational forces cause a shift of the otolith membrane and signal a shift in head position.

The semicircular canals sense angular acceleration and deceleration. The canals are filled with a fluid called endolymph which is set in motion by acceleration forces. The movement of the endolymph within the canals causes a bending of tiny hair cells which signal the brain of head rotation.

If a turn is initiated and held at a constant rate for several seconds or longer, the motion of the endolymph catches up with the canal walls and the hair cells are no longer bent. The brain receives the completely false impression that the turning has stopped.

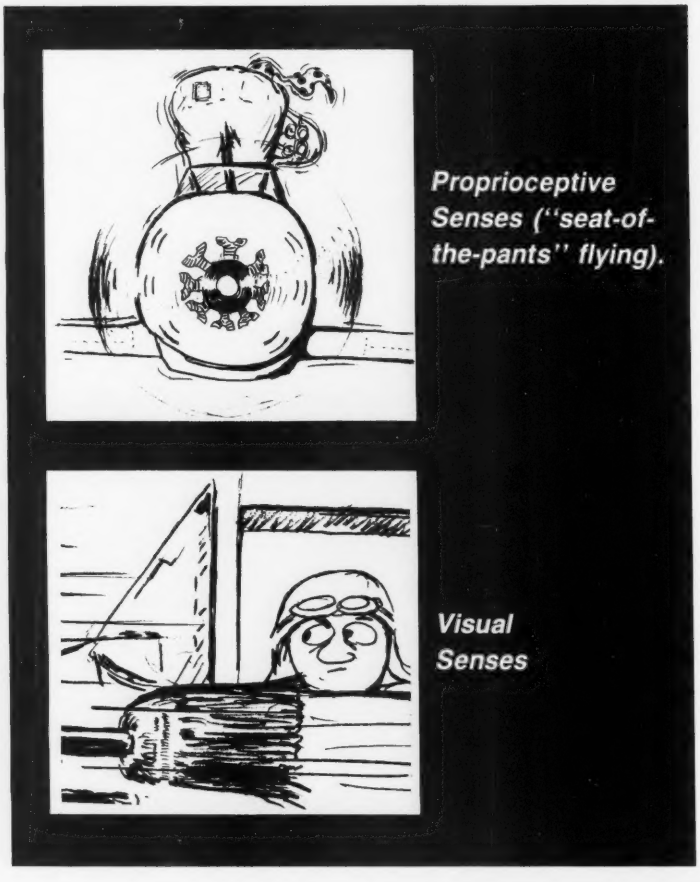
If a sudden stop is encountered, the canal walls stop, but the endolymph continues to move. Consequently, the brain receives the false impression that movement now occurs in the opposite direction. If this sensory illusion is believed by the aviator, an incorrect or adverse control input may result.


Vestibular Senses

Proprioceptive Senses. Commonly referred to as "seat-of-the-pants" flying, the proprioceptive system really concerns much more than just one part of the body. It involves the sensing of pressures on the joints, muscles, skin and also slight changes in the position of the internal organs. It is intimately associated with the vestibular system and to a lesser degree with the visual system. With proper training and experience, the aviator can distinguish the most *distinct* movements of the aircraft by the pressures of the aircraft seat upon the body.

Visual Senses. The visual sense is by far the most important of the three primary senses used in flight. The vestibular and proprioceptive senses are not reliable in flight due to the vulnerability to false inputs. The problems associated with spatial disorientation and vertigo are most often generated by the inadequacies of these two systems.

Essentially, the eyes confirm the input of the other two systems and provide the final determination of body position or movement. They also indicate the speed and direction of flight by noting the position of the aircraft relative to a fixed point of reference.



Proprioceptive Senses ("seat-of-the-pants" flying).

Visual Senses

During flight under instrument meteorological conditions, the outside reference of aircraft position and speed is lost, and the aviator must rely on instrument indications to obtain this information. The decision to rely on the instrument indications through the visual sense rather than to rely on the input from the other senses demands judgment and self-discipline which is achieved through proper training and experience.

The Flight Simulator

Definition. A flight simulator is a mechanical device that is designed to replicate an actual aircraft in cockpit design and appearance, visual scenery, motion cueing, control input and response, and flight physiological stimulation.

Fabrication. Various components of the actual aircraft are often used in the fabrication of a flight simulator. These components are located in the cockpit area, and their positioning and function is in direct correlation with the actual aircraft. Components which are not interchangeable between the aircraft and the simulator are manufactured by the simulator industry to meet certain specifications of design and function.

Visual representation is achieved in the simulator by means of a digital imagery generation system, camera modelboard system or laser imagery generation system. Various other systems and combinations are often used, and research and technology continue to improve their current acceptabilities.

Motion systems have evolved from no motion at all to a full 6-degree-of-motion-freedom base which provides inputs of pitch, roll, yaw, lateral displacement, longitudinal acceleration and deceleration, and vertical movement. These motion cues may be independent or combined.

Advantages. Flight simulators sustain

Various components of the actual aircraft are often used in the fabrication of a flight simulator.

the most distinct advantage by allowing aircrews to train in an absolutely safe environment while experiencing the most traumatic of aircraft systems malfunctions. Cost savings in fuel, ammunition expenditures, and aircraft wear and tear are highly significant in the long run. The use of flight simulators enhances aviator proficiency, when properly used, and improves the overall operational readiness posture of the unit.

Disadvantages. Accuracy of actual flight portrayal is the driving force in flight simulator design and engineering—the less accuracy depicted, the less viable training received by the crewmembers. Highly *inaccurate* flight portrayal may have the effect of compromising training; this is addressed in greater detail later.

The mechanical and visual restrictions inherent in ground-based flight simulators contribute to the inaccuracy of real-world portrayal. Although technological advances have tremendously improved the visual and motion systems in the recent past, the development of a simulator that performs "exactly" as a real aircraft in a real-world environment has not yet occurred.

The combination of mechanical and visual shortcomings in flight simulation as it relates to flight physiological senses of the crewmembers has propagated many individual and research group studies of the causes and implications of flight simulator sickness.

Motion Sickness

It is only natural to assume that motion is directly relevant to motion sickness. The multitude of symptoms that occur after experiencing certain motion-force conditions indicates that this is one obstacle to which humans have not yet adapted.

In the view of one research group, motion sickness is an ordinary result of exposure to certain moving environments. The incidence, time, course, symptom mix, etc., follow certain rules, some of which are known. It follows then, that if certain motion sickness symptoms are experienced in an aircraft, a simulator, which replicates that aircraft, should produce the same symptons. However, if a flight simulator produces motion sickness symptoms *not experienced* in the actual aircraft, it indicates that the simulator performs inadequately. Thus, it is proposed that the term

Cost savings in aircraft wear and tear are highly significant.

Highly inaccurate flight portrayal may have the effect of compromising training.

simulator sickness be applied only in those cases where the flight simulator fosters motion sickness symptoms not experienced in actual flight. (For a more detailed discussion on motion sickness, refer to Benson, A.J., "Motion Sickness," in Dhenin ed. *Aviation Medicine*, Tri-Med Books.)

Researchers do not believe that adaptation is the answer to the problem, although adaptation reasonably can be expected to occur and restrict the onset of many of the unpleasant symptoms of simulator exposure. This adaptation may generate certain responses, or an inhibition of responses, that may place the user in a precarious position when faced with similar but different situations in the real world.

Relevant to the study of motion sickness, spatial disorientation and vertigo, the Environmental Techtonics Corporation has developed a new flight simulator designed to teach fighter pilots to cope with these problems. The unit, called Gyrolab, is a specialized simulator which generates up to two times the force of gravity. It spins at the end of a short planetary arm and rotates on three axes to simulate pitch, roll and yaw.

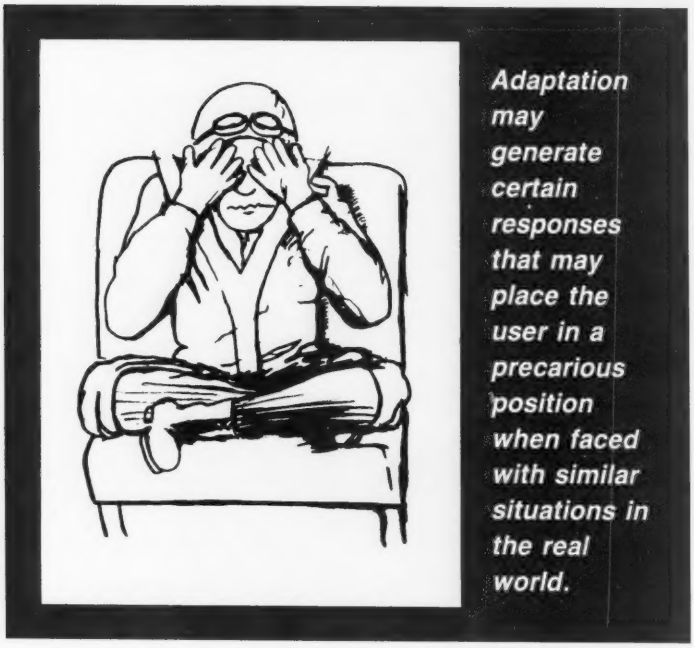
When pilots encounter high gravitational forces in flight without adequate visual reference, spatial disorientation may occur. If the pilot turns his or her head during this time, a disturbance of the vestibular system results, giving rise to severe dizziness and distorted perceptions. Spatial disorientation accounts for more than 40 percent of the crashes involving high performance aircraft. By using Gyrolab, pilots learn to recognize the onset and symptoms of spatial disorientation and to cope with the problem in a safe and tested manner.

Simulator Sickness

Findings. The effects of the psychophysiological disturbances relating to simulator sickness were found in both motion-based and fixed-base simulators. Among the symptoms noted are disorientation, dizziness, nausea, spinning sensations, flashbacks, visual dysfunction, burping, confusion and drowsiness.

Drowsiness is perhaps the most prominent symptom of simulator sickness. This symptom was reported in connection with nearly every simulator that caused aftereffects. During periods of intense exposure to simulator training, nausea was reported as a primary factor.

Drowsiness is the most prominent symptom of simulator sickness.



Adaptation may generate certain responses that may place the user in a precarious position when faced with similar situations in the real world.

Forty-eight pilots were surveyed during a 5-day period conducting fighter aircraft engagements and averaging a total of 12 hours of exposure for each pilot. More than 87 percent reported symptoms of simulator sickness, primarily nausea. Pilots reported sensations of climbing and turning while watching television, and some experienced an inversion of the visual field while lying down. In specific instances, symptoms were reported to have persisted for 8 to 10 hours after exposure.

In a workshop study conducted by Leibowitz and Associates (1984) considerable emphasis was placed on simulator design concepts. This research

included studies of the motion input and washout, field of view, scene detail and simulator tilt. A simultaneous study (for comparison purposes) was conducted in an automobile simulator. Many parallels were found to exist between the flight simulator and the automobile simulator. The onset of simulator sickness symptoms and effects were virtually the same. It was concluded that because of the multivariable aspects of simulators, it would be difficult to design research that would allow enough variables to be included in a factorial design to allow proper assessment of the interactions. This concept is substantiated in other research group findings as well, albeit in different terms.

Frank and Associates (1983) submit the following as chief candidates for research, since they appear to worsen the problem of simulator sickness:

- optical distortion
- poor resolution
- wide field of view
- visual flicker
- visual and inertial lags
- viewing distance
- head movements
- subject's physical state
- off-axis viewing
- frequency and duration of exposures
- scene content
- motion frequency/acceleration spectrum
- motion shudder
- visual-vestibular conflict

Optical distortion may cause simulator sickness.

Their study focused on the causes of simulator sickness and the evaluation of previously conducted studies of this phenomenon.

A Navy study conducted by Crosby and Kennedy (1982) of the P-3C and 2-F87 simulators stated:

The cause of these (simulator sickness) symptoms should be eliminated for the following reasons. The flight engineers are at risk when walking on the ladders at the exit of the simulator following training because of extreme unsteadiness induced by the simulator. The students become reluctant to take more training after this experience. Additionally, the symptoms of simulator sickness reduce the effectiveness of the flight engineers and hence jeopardize the flight crews in real flights that follow the training on the same day. Training is probably less effective because the flight engineers attend to their malaise rather than to the flight being simulated. Scheduling problems due to illness result in lost crew time on the simulator following aborts.

The use of antimotion-sickness drugs, even the best on the market, is not at all favorable—they cause drowsiness, dry mouth and blurring of vision. These conditions are certainly not conducive to the safe operation of an aircraft, should the requirement exist to fly an actual aircraft following

Navy flight engineers are at risk when walking on the ladders at the exit of the simulator.

a simulator training period.

I concur with the findings of the various research groups mentioned above and their documented reports. This concurrence is based upon in-depth experience as a flight simulator evaluation and acceptance pilot, involving intense exposure (more than 110 hours per month on specific occasions) and a rigorous application of repetitive flight tasks. During this, I experienced a majority of the previously stated simulator-sickness symptoms. Any attempt to completely suppress these symptoms would have been futile due to the requirement to operate the simulator with various components in an off-line mode and the necessity to exercise "playback" and "reset" functions repetitively.

I make one exception in concurring with previous research findings in that I experienced no *actual suffering* of simulator sickness. Perhaps the justification for this statement is founded in the prudent application of specific checks and balances in the approach to flight simulator operation, and in a working knowledge of the physiological senses and their vulnerabilities.

Factors that stood alone as most significantly contributive to the onset of simulator-sickness symptoms were:

- operation of simulator without motion
- frequent use of freeze for extended periods during banks and dives
- maladjustment of visual scene displays
- imbalance or "lag" between visual scene and motion cueing
- rapid or erratic head movements during increased gravity maneuvers
- excursions between day, dusk and night in visual scene illumination
- attempts to exit simulator from freeze mode in moderate to extreme pitch or bank angles
- exposure in excess of 2 hours duration without recess of at least 15 minutes

Implications. The negative implications of simulator sickness can essentially be grouped into three categories: compromised training benefit, reduced simulator use and simulator aftereffects. The latter is not unlike the aftereffects of other motion devices, but its relevance to safety is not yet known. Crew attitude and motivation must be highly regarded in respect to simulator training.

With one or more experiences of some form of simulator sickness, aircrews may become apathetic and dissuasion may occur between crewmembers. Through adaptation to simulator sickness symptoms, crewmembers may develop negative-habit transfers which could contribute to adverse reactions while in actual flight. The total realm of significant implications is not yet fully understood.

Conclusion And Recommendations

Conclusion. The occurrence of simulator sickness among crewmembers and instructors seems more prolific today than in the previous decade. But, the reasons are quite understandable—the increased usage of flight simulators and the increased awareness of the phenomenon of simulator sickness.

It is apparent that a substantial degree of concern exists over the implications and possible hazards associated with simulator sickness. A tremendous amount of research has been conducted on the physiological aspects of simulator sickness and an equal amount dedicated to the possible and probable implications. We must now arm ourselves with the knowledge acquired through this research and begin an educational program at the consumer level.

Recommendations. Perhaps the most comprehensive study of flight simulator sickness and its effect on the human factor was conducted in 1984 by approval of the Governing Board of the National Research Council. The committee was headed by Herschel W. Leibowitz, and the study is entitled "Research Issues in Simulator Sickness: Proceedings of a Workshop."

The following recommendations are intended to supplement and validate the findings and subsequent recommendations of the Leibowitz study. They are the result of firsthand experience, and were personally applied during more than 500 hours of intense flight simulator exposure, relative to simulator evaluation and acceptance testing:

Exposure: Do not exceed 3 hours during any given training day. Do not exceed 2 hours of continuous exposure without a minimum of a 15-minute recess.

Motion: Do not operate motion-based simulator without fully operational motion system—physiological sensory imbalance may occur due to the absence of acceleration force cueing.

Visual Scene: In multiple-screen simulators, ensure that proper balance of registration, resolution, focus and light intensity exists between screens.

Visual/Motion Balance: Ensure minimal (or preferably zero) lag exists between visual scene shifts and corresponding motion cueing.

Situation Freeze: Avoid indiscriminate use of the freeze function, particularly in moderate to excessive pitch and bank angles. If necessary, "blank" the visual imagery when anticipating extended periods of freeze. Before exiting simulator, select ground setup and blank visual.

Ambient Lighting: In simulators equipped with selectable day, dusk and night lighting capabilities, avoid arbitrary switching between lighting modes. When anticipating "night" training, attempt to conduct the preflight briefing in the simulator with only the cockpit instrument lights illuminated. This will allow some dark-adaption to occur prior to commencement of training.

Emergency Procedures: Avoid prolonged engagements that have a direct effect on airframe stability. This includes prolonged use of turbulence selectivity features when set at high levels.

Vestibular Imbalance: Avoid rapid or erratic head movements, especially during increased gravity loading maneuvers such as dive pullouts and bank angles greater than 30 degrees. Abrupt movement of the head during these maneuvers will alter acceleration force vectors and promote vestibular sensory imbalance.

Line-of-Sight Viewing: When occupying cabin positions other than pilot or copilot seats, avoid continuous or prolonged viewing of visual scenery. This "off-axis" viewing contributes to physiological sensory imbalance.

Do not operate motion-based simulator without fully operational motion system.

U.S. Army Class A Aviation Flight Mishaps

	Number	Flying Hours (estimated)	Rate	Fatalities	Total Cost (in millions)
FY 85 (to 31 March)	29	703,884	4.12	24	$48.9
FY 86 (to 31 March)	19	716,040	2.65	11	$35.4

U.S. Army Information Systems Command
ATC ACTION LINE

Aeronautical Services Office Answers Your Questions

CW4 Lawrence K. Hanna
U.S. Army Aeronautical Services Office
Cameron Station, Alexandria, VA

THE AERONAUTICAL Services Office is constantly being asked to interpret U.S. Army and Federal Aviation Regulations. So, we again have decided to publish a few of the more frequently asked questions:

• Why are incorrect radio frequencies still being listed in the instrument approach procedures (IAPs) book?

All frequencies published on IAPs are considered secondary information. When a frequency is changed by towers, approach controls, flight service stations, etc., it may take as long as a year or more before it is changed on the IAP. IAPs are only amended for procedural, safety of flight, or operational reasons, and updating IAPs every time a frequency or minor change is required is not cost effective. The most current information may be obtained from the IFR (instrument flight rules) and VFR (visual flight rules) supplements, which are constantly being revised and updated.

• In executing the nondirectional beacon (NDB) Rwy 15 approach at Kissimmee, FL, am I authorized to cross-tune my automatic direction finder (ADF) receiver to be able to descend to the lower minimums (ADF receiver only)?

There is not a reference that allows use of dual NDB minimums without the aircraft having dual NDB equipment. Cross-tuning is not allowed.

• I am flying at 4,000 feet above ground level, VFR, maintaining basic cloud clearance and approaching a control zone that has a 3,000 foot ceiling. Am I required to call the controlling agency to pass through the control zone?

The control zone is for the benefit of the instrument rated pilots under the coordination of air traffic control (ATC). VFR pilots also are allowed in a control zone without clearance as long as they abide by the basic VFR weather minimums for controlled airspace. A call is not required, but the prudent aviator would make one. An excellent article about controlled airspace was reprinted in the August 1985 issue of the *Aviation Digest*. A copy can be obtained by writing to Editor, *Aviation Digest*, P.O. Box 699, Ft. Rucker, AL 36362-5000; or, call AUTOVON 558-3178; FTS 533-3178; commercial 205-255-3178.

• I execute a missed approach at my destination and request clearance to my alternate. AR 95-1 says a revised flight plan must be filed. What constitutes a revised flight plan?

You have filed a revised flight plan when you call ATC, request and receive clearance to your alternate. This may be a short-range clearance depending on whether you are staying in the local area or proceeding into another approach control's area of responsibility. Contact with the local flight service station is not necessary unless you wish

Correction

The February Action Line statement in the middle of paragraph 4, "Make sure both reported...." conflicts with AR 95-1. paragraph 4-5*b*(5), "*An approach may be initiated, regardless of ceiling and visibility.*"

Also another sentence needs clarification. On the last line of column 1, beginning with "Never...." AR 95-1, paragraph 4-5*d* states:

d. Landing. An aircraft will not be flown below the published MDA or an approach continued below the DH unless the following exist:

(1) The approach threshold of the runway, or the approach lights or other marking identifiable with the approach end of the runway or landing area, must be clearly visible to the pilot.

(2) The aircraft must be in a position from which a safe approach to the runway or landing area can be made.

In all cases, procedures cited in the regulation are to be observed.

Readers are encouraged to address matters concerning air traffic control to: Director, USAATCA Aeronautical Services Office, Cameron Station, Alexandria, VA 22304-5050.